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Alonzo F. Havens's Improvements in Working Retorts.

These improvements relate to several points connected with the charging of retorts and the evolution of the gas therefrom. In the first place, the dip-pipe in the main is entirely abolished, and a device, or combination of devices, substituted therefor, which operates when the retort lid is removed for charging; and whose construction and working are obvious from the figure. This arrangement may be described as follows:

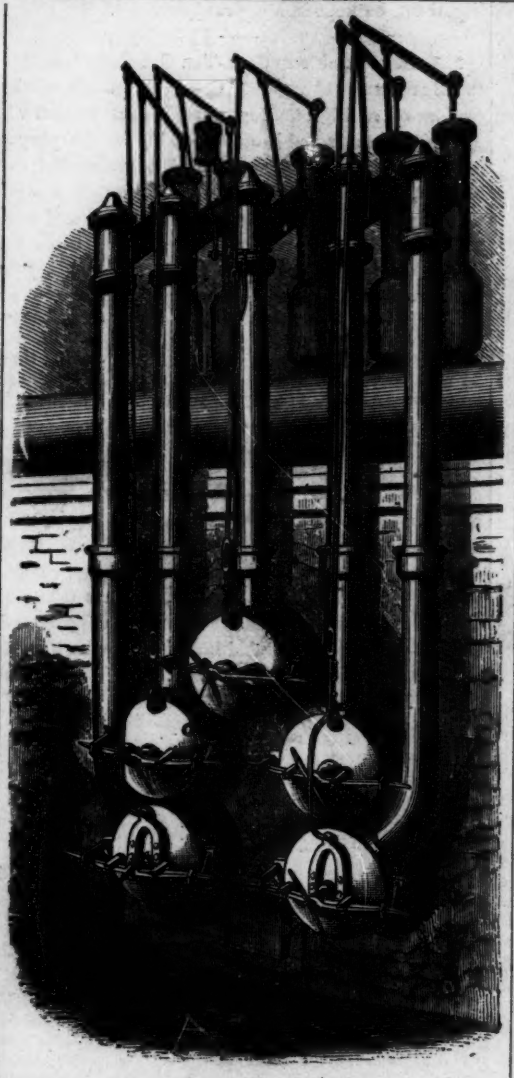
A central vertical tube, open both at top and bottom, has, passing through it, and working freely without friction, a rod, to the lower end of which is attached an arrangement consisting essentially of two cups, one above opening upwards, and another below opening downwards. The superior cup contains water or tar, and constitutes a dip-seal, which closes the lower open end of the vertical tube when the retort-lid is on and the rod elevated, thus shutting off the atmospheric pressure. At the same time, there is opened another dip-seal formed by the inverted cup below, furnishing free passage for the gas to the condensers and purifiers. When the retort-lid is removed, it follows, from the fact that the vertical rod is *permanently* and *adjustably* attached, by means of a combination of rods and a lever, to the lid, that the double cup falls by its own weight, thus closing automatically the lower cup-seal, and preventing reflux of gas or ingress of air. This *permanent* automatic attachment of the valvular apparatus to the retort-lid is a peculiar feature of Mr. Havens's inventions, and is rendered practicable by his new mode of sealing the retort-lids without luting; which consists in using lids and mouth-pieces of cast iron (of any of the usual forms, though he prefers them conical, as figured here), in one of which is cast a groove, with an acute-edged rim to correspond, on the other. The groove is then filled with a porous cement, and the lid fitted on till the cement sets. This cement being *porous*, all tar is *absorbed* thereby, while fluid, and does not therefore harden or bake on the joint and interfere with its tightness, as is liable to occur with ground joints.

Mr. Havens has favored us with the following communication on the subject of his inventions:

"My inventions comprise the advantageous features of the ordinary system of hydraulic seals in a main, without any of its inherent faults.

I do not claim the use of valves, nor do I believe in opening the pipe connecting the retort with the main at all times, without means of preventing the flow of gas returning through an imperfect retort, or *the* entrance of air through the same in accordance with varying pressures.

But my automatic system of attachment between



the retort lid and the seal, by means of rods, or their equivalents, I do claim. My adjustable attachment to these rods, is also clearly shown in the drawing, by which the seal may be raised or lowered at will. The simplicity and reliability of action of the whole machinery are such that a man having once closed a retort, can do it a second time with his eyes bandaged. The cost of the attachments does not exceed that of the usual dip-pipe, as the seals and the retort-lids are of cast-iron, and require no machine-work for finishing, and can be furnished at the price of ordinary castings. The cotter-bar and screw, also cost but a trifle more than the ordinary form, and as both lids and screws are never removed for luting, half the usual number only is required, both labor and luting material being also saved, as well as wear and tear of both lids and screws. The joint will last as long as the retort itself.

In old works, already provided with mains, the removal of the dip-pipes and of the water, increases to an important degree the gas-transmitting capacity of the main, which is highly important when consumption is increasing rapidly—while in the case of new works, the large outlay usually required for a main is altogether dispensed with.

Other advantages, it is scarcely necessary to add, are those which have chiefly led me to the adoption of this system; namely, the important increase in quantity and quality of the gas, the prevention of carbon-accumulations in the retorts, and a proportional absence of stoppages of the stand-pipes.

Yours respectfully,
A. F. Havens."

Hare's Light, for Lecture Diagrams.

Professor Gross recently made a communication to the Mass. Institute of Technology, upon the methods employed in illustrating lectures on physics, by means of photographs projected upon a screen. The oxyhydrogen or lime light is used for the purpose. After giving a short sketch of the history of the oxyhydrogen blow-pipe, the Professor exhibited a new and superior burner, used by Mr. Black; the inner tube of the jet is perforated with holes, from which issues a more perfect mixture of the gasss, and consequently finer results than are ordinarily obtained. The theory of projecting images upon the screen was explained, and then the applications of the light to lecture purposes was taken up. The decomposition of water by electricity was illustrated in a most striking and vivid manner. The evaporation of ether, at the ordinary temperature, was shown, the heavy vapor slowly rolling over the edge of the vessel. Also the convection of currents of air was well illustrated. A cylinder of steatite, being substituted for that of lime in the oxyhydrogen flame and its image magnified and projected upon the screen, it could be plainly seen that the steatite was partially fused; it was a good illustration of the intense heat developed in the oxyhydrogen flame.

The Professor then exhibited the aphongoscope, an instrument intended for the projection upon the screen of opaque objects. Two lime lights are made, by means of condensing lenses, to illuminate the object to be shown, which may be a card-photograph, coin, cast, or almost any opaque object; and a magnifying lens forms the image upon the screen. This instrument wes brought from London by Mr. Waldo Ross.

Several large coal piles in Chicago have never been extinguished since the great fire.

Chemical Repertory,

No. 66.—April 16, 1872.
EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

219. Consumption of Horse Flesh in Paris.—Dr. Decroix.—From the contents of this paper it appears that since July 9, 1866, when the sale of horse-flesh was first commenced under proper sanitary supervision, up to the present day, the consumption of this meat as human food has steadily increased, 70,000 horses having been consumed during the late siege in Paris alone. The author estimates that annually 200,000 horses can be readily supplied for consumption of meat in France, and, taking the average weight of meat suitable for consumption of each horse at 200 kilos., this will yield 40,000,000 kilos. (=88 million lbs.) of horse flesh for consumption.

220. Thermochemical Researches.—Julius Thomsen.—On the heat disengaged by the neutralization of bases. For the alkalies and alkaline earths with sulphuric acid, the author calculates that about 30,000 calories are developed to every molecule of sulphuric acid. The highest is baryta, which gives 36,896, and the lowest ammonia, which gives only 28,152. In neutralizing hydrochloric acid with the same bases, about 27,000 are developed to every two molecules of HCl, ammonia being again the lowest, namely 24,544; and thallium giving 44,340. For nitric acid with these bases, about 27,500 calories are evolved. He concluded that

1. With the exception of ammonia, all these bases develop nearly the same amount of heat with the same acids, with two exceptions.
2. The heat of neutralization may have various values.
3. Ammonia shows throughout a markedly smaller degree of heat on neutralization, and evidently belongs to another group.

221. How to Fry.—All housekeepers know that to fry well, their fat should be hot. But they do not attend to it half as scrupulously as they would if they understood the true philosophy of it. Boiling, bubbling-hot fat cannot penetrate anything, and cooks to perfection; tepid fat penetrates everywhere, and does not cook at all, but actually prevents cooking. Any housekeeper who reads this, and chooses to profit by it, need never put any greasy, fried, half-cooked, indigestible food upon her table. The whole secret consists in having the fat boiling before the things are put in. There is one other condition which follows naturally from the first one, but which is almost invariably lost sight of, even by good cooks, and that is, that the fat should entirely cover the article to be fried. The reason of this is, that the part not at once covered by the fat remains cold, cools off the fat near it, and then absorbs the tepid fat, just the same as if it never had been hot. Frying-pans should be deep, well filled, and heated to the boiling point, and then it is easy to turn out fried food nicely crisp, brown, and dry, on the outside, and perfectly soft, moist and well cooked within. It is a peculiarity of the outside crust of things fried in boiling fat that the fat itself drips off from it as readily as water; hence, well fried articles are neither greasy in appearance nor very greasy in reality. Frying ought to be as easy as boiling.—*Christian Union.*

222. Quick Drying of Glue.—H. Fleck.—The author recommends the use of certain salts (sulphates of soda, ammonia or magnesia, iron, zinc, copper, etc.) which absorb the water of the glue jelly, which does then not putrefy, and dries easily.—*Dingler.*

223. Cooking Eggs.—It is understood that eggs are more easily digested if "rare" than "well done;" but which portion of the egg resists digestion—the "white," which is nearly pure albumen, or the yelk? Lately, experiments have been made in this direction, with ample opportunity of demonstrating that healthy gastric juice, which the stomach secretes for purposes of digestion, will not act readily on firmly coagulated white of egg, even if cut in pieces not larger than ordinary peas (and that is as fine as people usually chew their food!) while it acts with facility upon the more brittle yolk. The reason is that the coagulated albumen is very compact and tenacious, and would need to be "ground to powder" to accept the chemical affinities of the gastric juice. Pour into a basin boiling water sufficient to cover the eggs, put the eggs into the water and let them remain eight or ten minutes, according to circumstances and your own taste; keep the water nearly up to boiling temperature, but don't boil the eggs. Old eggs will cook more quickly than fresh ones, and of course small ones quicker than large ones. By this process you will find the yelks well cooked, while the white is left in a condition to digest readily.—*Exch.*

[Eggsactly *our* "style."—Ed.]

224. Javelle Water.—Old engravings, wood-cuts, and all kind of printed matter, that has turned yellow, is completely restored by being immersed in this preparation for only one minute, without the least injury to the paper, if the precaution is taken to thoroughly wash the article in water containing a little hyposulphite of soda. Undyed linen and cotton goods of all kinds, however soiled or dirty, are rendered snowy white in a very short time by merely placing them in the liquid mentioned. For the preparation of Javelle water, take four pounds of bicarbonate of soda, one pound of chloride of lime, put the soda into a kettle over the fire, add one gallon of boiling water, let it boil from ten to fifteen minutes, then stir in the chloride of lime, avoiding lumps. When cold, the liquid can be kept in a jug ready for use.

225. Nature of the Coal-Tar Oil Products Boiling Between 161° and 169° C.—P. Jannasch.—When coal-tar oil of high boiling point is first treated with hot and concentrated caustic soda ley for the purpose of eliminating carbolic acid, and next rectified over sodium, the result is that there are obtained two substances, one of which boils at between 161° and 165°, and the other at between 155° and 169°; these products (not further specified) yield, on being treated with bromine, large crystals fusing at between 86° and 87°, but become decomposed at a higher temperature, and even cannot bear boiling with alcohol. Treated with nitric acid, these crystals yield picric acid; treated with sodium amalgam, they yield a solid crystalline mono-bromated product, boiling at from 212° to 216°, fusing at between 38° and 39°, and very soluble in ether, benzole, chloroform, and alcohol.

226. Water for San Francisco.—San Francisco has abandoned the notable scheme of getting its water from Lake Tahoe, on the top of the Sierra Nevada Mountains. A commission of its city government, backed by scientific engineers, reports decidedly against it, and says that there is enough of good water for a city of a million inhabitants to be had on the peninsula of San Francisco itself, and that, in short, it is only necessary to enlarge its present sources and take in neighboring creeks and springs, to get a supply of sixty million gallons of water a day, which would be forty gallons apiece for a million and a half people. But the Lake Tahoe scheme was so audacious it will be hard for the true Californian to give it up.—*Amer. Artisan.*

227. Photographic.—At a recent meeting of the Massachusetts Institute of Technology, Mr. Stimpson made a few remarks, drawing attention to the fact that the intensity of the calcium light permitted the presence of a considerable amount of common artificial or sunlight in the room, without impairing the clearness of the image; and therefore without the fatigue, to the eyes, experienced in a short time when bright pictures are represented in a very dark room. He explained that the greater comfort to the eyes, in using semi-transparent instead of opaque shades on ordinary lights, was due to the same principle.

228. A Live Fish Embedded in Ice.—A small fish, imbedded in ice, was found by some workmen engaged in taking ice from the Humboldt to fill the ice-house of Mr. Haynes. The little fellow was solidly encased in ice as clear as crystal, and when placed in water and the ice gradually melted from it, its rigidity left, the tail quivered, and after turning over a few times it swam away as if nothing had happened. How long his minnow-ship had been thus housed is not known but probably not less than two months. It is now a companion of the gold fish at Haynes's saloon.—*Nevada Paper.*

229. Walnut Dye for Wood.—A solution of equal parts of permanganate of potash and sulphate of magnesia, applied to white wood by means of a brush, will produce an excellent brown color resembling that of the walnut. A second coating should be applied as soon as the first is dry.—*Mann's Review.*

230. New Physical Law.—A. Valson.—From the researches made by the author, he concludes the following is a new law in physics: For all normal solutions—that is to say, those which contain each one equivalent of anhydrous salt, weighed in grammes, dissolved in one litre of water—the product of the density by the capillary height is perceptibly the same.—*Les Mondes.*

231. Note on Petroleum.—M. Byasson.—Reference is made to the investigations of M. M. Pelouze and Cahours, on the American Petroleums in 1863, and the conclusion arrived at that petroleum consists of a series of hydrocarbons with boiling points differing by a few degrees, forming a series from paraffines, of which there may be two or three or more, up to the light naphthas. The black substance separated from petroleum by sulphuric acid, when distilled, gives two series of products, one boiling at a temperature below 80° C., the others at about 250°. These are hydrocarbons of the ethylene series, but containing sulphur. The phenomenon of "cracking" is also described, and finally mention is made of an apparatus invented by M. Byasson (?) for testing the safety of kerosene, by the measure of the tension of the vapor given off, by means of a column of water.—*Acad. of Sciences.*

232. Waste of Coal.—The waste in coal mining averages nearly, if not quite, 33⅓ per cent. of what is taken out of the mines. A great deal is lost in drilling and blasting at the breasts, but a great deal more is lost in the process of crushing the lumps in the breakers and loading it into cars. It is not known that much, if any, of this waste can be prevented, but one has but to observe the mountains of coal dust growing up on all sides about the mouths of the pits, to realize that a vast amount of labor has thus been lost, and a vast amount of valuable fuel destroyed. It would be very costly to separate the coal from the slate and dirt that is mixed with and through it, and if this were done it would be found that from long exposure to the weather, it had lost much in quality. Another difficulty is found in making it up into blocks that will not crumble in the fire, and inventing a process of manufacturing the dust fuel that shall be cheap enough to leave a profit on the price for which it could be marketed.—*Iron Age.*

233. Sulphuretted Alcohol.—Prof. Gamgee informs us of a new concentrated disinfectant, obtained by impregnating alcohol with sulphurous acid, of which gas it is capable of containing no less than three hundred times its own volume. The portability and convenience of such a fluid will be obvious to every one; but its general use as a disinfectant will be probably somewhat qualified by the unpleasant smell. But, for the destruction of insects, and as a substitute for fumigation with burning sulphur, it has the recommendation of apparent efficiency.—*Prof. Joy in Sci. Amer.*

[If this be thus, how about its use for *bleaching* purposes?—Ed.]

234. Golden Hair Wash.—Mix together 17 parts crystalized caustic baryta and 3 parts chlorate of potassa in fine powder, and fuse at a gentle heat. Wash out the chloride of potassium with cold water, and pour on the residue, cold (about 8 parts), a cold solution of 8 parts glacial phosphoric acid in 25 parts of water, cooling the mixture with ice. After some time the solution is decanted off from the sediment, and constitutes the "golden hair wash," a means of dyeing the hair a yellowish foxy red.—*Journal Applied Chemistry.*

235. Hearty Work.—A man's total outward work, his whole effect upon the world in 24 hours, has been reckoned about 350 foot-tons. That may be taken as a good "hard day's work." During the same time the heart has been working at the rate of 120 foot-tons. That is to say, if all the pulses of a day and night could be concentrated and welded into one great throb, that throb would be enough to throw a ton of iron 120 feet into the air. And yet the heart is never weary.—*Dr. Van der Weyde.*

236. Ozone-Genesis.—Dr. Pincus.—The author states that, if perfectly pure dried hydrogen gas is caused to burn, in a very small flame, from a jet ending in a very fine point, the smell of ozone is very distinctly perceived, and it becomes more conspicuous if a dry and clean beaker-glass is held over the flame. When, by the aid of a properly contrived apparatus, the combustion takes place in pure oxygen, the same phenomenon is observed.—*Chem. News.*

237. Crenic and Apocrenic Acids of the Mineral-Waters of Forges.—M. Boutigny.—These waters it is stated, contain amounts of the protocrenate of iron, varying with the springs from which they come, The protocrenate of iron is soluble, and gives a styptic solution with water, showing all the reactions of a protosalt of iron. It absorbs oxygen with great avidity, and in the form of the persalt is insoluble, forming a flocculent precipitate. Evaporation in a vacuum, and in a current of nitrogen, gave only negative results. Concentration by cold, with the application of the Tellier method, afforded the salt relatively, but not absolutely, in a dry state. Crenic acid, the author found to have the composition $C_{24} H_{12} O_{16}$, while apocrenic acid is $C_{18} H_{12} O_{24}$. To isolate these acids for examination, the author took a quantity of the water from these springs containing a percrenate of iron, and boiled it for half an hour with potassa, making a mixture consisting of 1 part of caustic potassa, 10 parts of crenate of iron, 100 parts of water. The solution is then filtered cold from the precipitated sesquioxide of iron, and saturated with a solution of hydrochloric acid. In a short time the crenic and apocrenic acids deposit in flocks of a dirty grey color. They are filtered, washed with distilled water, and then dried. They then appear as an amorphous mass of a pale brown color, very hygroscopic, and with a marked acid reaction. They readily recombine with iron to form salts. These acids were first discovered by Berzelius in the waters of Porla, in Sweden. Their effects medicinally are claimed to be very satisfactory.

238. Coal Mines on Fire.—We understand that the Bellingham Bay coal mines are in danger of being destroyed by fire. It has been smouldering for some time, but has recently got beyond control and threatens to consume the whole seam. A few days ago the flames drove out the workmen, and it is now suggested to deluge the mine in order to save the workings from destruction.—*Scientific Press.*

239. Dr. Kane, the arctic explorer, recorded the very striking and suggestive fact that snow at a temperature of 40 degrees below zero, F., loses much of its anti-frictional quality. He found it nearly as difficult to draw sleds upon such snow as upon sand.

240. Noxious Effects of the Tar Colors.—W. Mayer.—The author states that, as regards the aniline colors, if pure and properly made, they are not poisonous, but that, in consequence of imperfections in the preparation, these pigments often contain arsenic and picric acid, to which is due the poisonous action of these substances, while, as regards the phenol pigments (rosolic acid [aurine], coralline, and azuline) they are seldom, if ever, quite free from phenol, and hence poisonous.

241. Evaporation and Condensation of Solid Substances.—Alexander Naumann.—The times of the evaporation and condensation of solid substances in vacuo are very short, and the vapors of the same substance at the same temperature have the same tension; no matter whether they are formed from the solid or fluid state.—*Ger. Chem. Soc.*

242. Muddy Waters.—Chloride of iron and carbonate of soda, in the proportion of 32 kilos. of the former salt and 84·5 of the latter, to a quantity of water equal to 1000 cubic metres, has been found a most valuable and quite innocuous means of purifying water, even such as is otherwise quite unfit for drinking purposes and could not be rendered so by alum. The salts alluded to are best previously dissolved in some pure water, and the solutions, that of iron first, poured into the tank containing the water intended to be operated upon. The soda solution is not added until after a few moments, the water being first vigorously stirred. The soda solution having been added, the fluid is stirred again, and then left quiet for the purpose of allowing the very bulky and flocculent sediment to deposit: this takes considerable time—from twenty-four to thirty-six hours. The *strychnos potatorum* is used in India for purifying clayey water.—*Chemical News.*

Report on Analyses of River Waters for Supply of Springfield, Mass.

By S. Dana Hayes.

[Communicated by the Author.]

No. 20 State Street, Boston, Mass.

To the Committee on a Supply of Pure Water for the City of Springfield:

Gentlemen: At intervals since the twentieth of September, I have received from your consulting Engineer, Mr. Clemens Herschel, thirteen specimens of waters from different sources in and near the City of Springfield, and one sample of river sand, for analysis and investigation; and I now present for your consideration the following

REPORT.

Throughout this investigation, I have been impressed with the general good quality of all these waters, as compared with those of many large cities; and Springfield seems to be especially favored in having so many available sources of pure soft water, in ample quantity, within comparatively easy reach. But the difficulty and responsibility of selecting the best one for general consumption, is hardly lessened, although they are comparatively pure; as the difference between them, although small in quantity, in a single gallon, becomes very considerable when estimated upon the whole supply for a city like Springfield.

The city of Hartford, Connecticut, consumed about 5,000,000 gallons of water daily, during the months July and August last year; and as that water contained more than one and a half (1 64-100) grains of *organic* matter in each gallon, there were passed through the service pipes and delivered, *one thousand and sixty-seven pounds* of this objectionable impurity: while if this water had been as pure as that supplied to the city of Boston, for instance, containing 83-100 of a grain of organic matter in the gallon, the total weight of this impurity consumed, would have been reduced nearly one-half, or to *five hundred and forty pounds*. And it is worthy of remark, that the water supplied to Boston is entirely satisfactory to the inhabitants, while that of Hartford (Trout Brook) has been the subject of frequent complaints lately.

Before stating the results of my analyses, I desire to remind the Committee that all these samples, received from Mr. Herschel, were taken after a second season of almost unprecedented drought. Some of them, at times when the water courses were remarkably low, and others, just after light rains had washed down the accumulated impurities of the summer months from the banks of the streams. These samples, therefore, represent all the waters proposed for the supply of your city, in an unfavorable condition, and one that seldom occurs, but they are nevertheless comparatively pure, as stated before.

THE ANALYSES AND RESULTS.

The waters reached me in new glass demijohns of large size, carefully corked, and designated by numbers, and the analyses were made before I was informed where the different specimens came from.

The constituents of most importance in these waters, and the only ones that need be considered when comparing them, are the *organic* matters, of vegetable or animal origin, and it has been necessary to determine their *kind*, as well as proportionate weight. It is customary in recording analyses of waters to give only the weights of impurities present, but it will be seen that I have made especial investigation of the organic matters, so as to ascertain which were the least objectionable. One instance of this is in the Aqueduct water, (sample No. 2,) which contains a smaller weight of organic matter than some of the others, but it is organic matter already in a state of decay, and consequently more objectionable as a constituent of drinking water than larger quantities of less offensive impurity.

An examination of the following tables of results, indicates that the water of Chicopee River is the purest of those received from Springfield. An average sample of this water, taken on four different occasions, both before and after rains, from different places in the river, was analyzed, after it had settled for some time to remove all sedimentary and floating particles, in the same manner as would be done by distributing pipes, reservoirs, and sand filters in the large way. And one United States gallon contained of

	Grains
Organic matters	1 6-100
Mineral	1 64-100
Total weight of impurities	2 70-100

It is in every respect suitable for drinking, manufacturing purposes, and for general distribution in a large city.

The waters from the Connecticut River, taken at two different places, although very good, are not so free from objectionable impurities as those of the Chicopee. While the Mill River water is noticeably inferior to either of the others. The organic matter in this sample consists largely of a confervoid growth, which decomposes when the water is kept at rest in a warm place, giving rise to disagreeable odors and taste, and the water itself is highly colored by this substance. Sample No. 2, of Aqueduct water, is one in which the organic impurities have already decomposed, probably the effect of stagnation, and although not a bad or dangerous water, it is not so suitable for distribution as those of the Chicopee and Connecticut rivers.

TABLE.

Showing detailed Results of Analyses of one U. S. Gallon.

SOURCES OF WATERS.	Conn. Holyoke.	Aqued't.	Conn. Spr'gfield	Chicopee, B's Bend.	Chicopee, B's Bend.	Mill River.
Chloride of Sodium. Common Salt.	0.563	0.217	0.600	0.462	0.448	0.721
Other salts of Soda and Potash	0.141	traces	0.133	0.190	0.116	0.161
Sulphate of Lime	0.139	0.140	0.180	0.123	0.109	0.217
Bi-Carbonates of Lime & Magnesia	1.134	1.102	1.207	1.078	1.032	1.811
Silica and Sand	0.110		0.111	0.100	0.100	traces
Oxides of Iron and Alumina	0.190	0.161	0.140	traces	traces	traces
Organic Matters	1.440	1.920	1.400	0.900	0.930	3.220
Total weights of impurities in grains	3.640	3.560	3.820	2.870	2.730	6.120
Deg'e of Hardness, Clark's Scale	0.43	0.28	0.51	0.35	0.30	0.63

The preceding table shows the proportionate weight of each important constituent in these waters, and gives the results of complete chemical and physical analyses. The differences of composition in the soft waters are small. These results were obtained by chemical and microscopic tests, and by keeping the waters in a warm place for many days, examining the products of decomposition and germination from time to time.

ACTION ON LEAD.

These waters are all thoroughly aerated, or charged with air and carbonic acid gas; and they all act upon metallic lead, the well waters more energetically than the others There are very few natural waters that will not corrode lead, so that I have not considered it necessary to determine the exact quantity which each of these will dissolve There are many kinds of service pipes in common use, and the responsibility of selecting should rest with the householder in every case; but although lead pipe is so easily adapted and put in place, it is, in my opinion, an unsafe conductor for drinking waters.

SAND.

A sample of sand taken at Burcham's Bend, Chicopee River, five feet below the surface, was also received and analyzed, to ascertain its characters as a material for filters.

One hundred parts of dry sand contained

Silicious minerals	99.51
Organic matter	0.35
Soluble matters	0.14
	100.00

These particles of sand represent a great variety of granitic and quartzose minerals, very free from organic matter or soluble salts, and forming an excellent material for filter beds.

RIVER WATERS.

The larger supplies of fresh water, suitable for cities and towns, are either moving streams, or comparatively quiet lakes and ponds, as wells and springs never yield sufficiently reliable quantities for this purpose. Both these sources always receive drainage of some kind, either from forests and decayed vegetable matters, cultivated fields, mills, manufactories, towns, or cities, and both are freed from such contamination by atmospheric and oxydizing agencies. There are well known instances, where the characters of such portable waters have been greatly changed, by merely falling over a dam, or in the passage across medium sized ponds, the purification depending mainly upon the motion of the water.

Of the two kinds, river and pond waters, the former are naturally the purest; they are in constant motion, containing a larger proportion of air and exposing greater surface to the action of sun and atmosphere; and it may be stated positively that no drainage matter remains as such, for any length of time, in a well aerated water, when agitated in contact with the atmosphere, as in the case of a large river, with rapid current.

I do not draw any comparison between well waters and those of rivers, because all practice and experience teach the superiority of the latter for supplying cities.

Respectfully submitted,
S. DANA HAYES,
State Assayer for Massachusetts.
November 10, 1871.

A Method of Observing Vibrating Flames.

A contemporary gives a description of a simple apparatus for observing the phenomena of vibrating or sounding flames. A disk of white card board is constructed with oblong apertures in a radial direction; this is set upon a spindle so as to admit of rotation at the requisite speed.

To examine the flame of a gas light, for instance (the flame being protected by a glass tube from the disturbing effects of air currents), place the disk in front of the light, so that the eye can see the light through each slit as it comes to the vertical position. If now, the speed of the disks' rotation is such that the interval of time between two slits passing the eye is just equal to the period of a vibration of the flame, the flame appears to be motionless; but if this velocity of rotation be reduced, the flame will be observed to pass slowly through its changes of form. If the interval is one-half, or one-third of the period of the vibration of the flame, the illusion of a disk having two or three times the number of real slits will be produced. It is only when the periods of flame-vibration and of the over lapping of two successive slits coincide in time, that the flame and disk appear motionless; when this is otherwise, the disk revolves in one direction or the other.

This plan affords a ready means of counting the number of vibrations of a flame, and by substituting a wire for the vibrating flame, the spiral course of the undulations produced in it may likewise be observed. Mr. Charles Watson, who has described the experiment, has made some very accurate observations upon the times of vibrations of flame within tubes of different dimensions.—*Jour. Franklin Institute.*

The Constituents of Petroleum.

By CHARLES F. CHANDLER, PH. D.

[Communicated to this Journal by the Author.]

The lighter oils in petroleum belong mostly to the group of hydrocarbons known as the hydrides of the alcohol radicals, or marsh gas series; the heavier oils are believed to belong to the olefines, or ethylene series. Neither of the groups have been fully studied, and the exact constitution of the heavier portions of petroleum has yet to be determined.

Table I. shows the composition, boiling points, and gravities of some of the members of the first group, or marsh gas series.

Table II. shows the composition, boiling points, and gravities of the members of the olefines, or ethylene series.

The first or lowest members of each series are gases at ordinary temperatures; the intermediate members, liquids; the highest members, solids.

TABLE I.

The Hydrides of the Alcoholic radicals, or Marsh Gas Series of Hydrocarbons.

Names.	Formulæ	Carbon	Hydrogen.	Boiling Points.	Specific Gravity.	Density Beaume
Marsh gas	$C^2 H^4$	75.00	25.00	A gas.		
Hydride of Ethyle	$C^4 H^6$	80.00	20.00	A gas.		
Hydride of Propyle	$C^6 H^8$	81.81	18.19	A gas.	0.600	106°
Hydride of Butyle	$C^8 H^{10}$	82.80	17.20	34°F.	0.628	98°
Hydride of Amyle	$C^{10} H^{12}$	83.33	16.67	86°	0.669	86°.5
Hydride of Hexyle	$C^{12} H^{14}$	83.72	16.28	154°	0.699	72°
Hydride of Heptyle	$C^{14} H^{16}$	84.	16.00	200°	0.726	64°.5
Hydride of Octyle	$C^{16} H^{18}$	84.21	15.79	242°	0.741	60°.5
Hydride of Nonyle	$C^{18} H^{20}$	84.38	15.62	278°	0.757	56°.5
Hydride of Decatyle	$C^{20} H^{22}$	84.51	15.49	321°	0.765	54°.5
Hydride of Endecatyle	$C^{22} H^{24}$	84.61	15.39	360°	0.776	52°
Hydride of Dodecatyle	$C^{24} H^{26}$	84.70	15.30	388°	0.792	48°
Hydride of Tridecatyle	$C^{26} H^{28}$	84.78	15.22	422°		
Hydride of Tetradecatyle	$C^{28} H^{30}$	84.85	15.15	460°		
Hydride of Pentadecatyle	$C^{30} H^{32}$	84.90	15.10	496°		
	$C^{36} H^{38}$	85.04	14.96			
	$C^{40} H^{42}$	85.11	14.89			
	$C^{46} H^{48}$	85.18	14.82			
	$C^{50} H^{52}$	85.23	14.87			
Paraffine	$C^{54} H^{56}$	85.26	14.74	Solid.		31°.5
Paraffine	$C^{60} A^{62}$	85.31	14.69	698°F.		

TABLE II.

The Olefines, or Ethylene Series of Hydrocarbons.

Names.	Formulæ	Boiling Points.	Specific Grav.	Density B.
Ethylene (Olefiant Gas)	$C^4 H^4$	Gas.		
Propylene	$C^6 H^6$	0°F.		
Butylene	$C^8 H^8$	37°.4		
Amylene	$C^{10} H^{10}$	95°		
Hexylene	$C^{12} H^{12}$	156°		
Heptylene	$C^{14} H^{14}$	203°		
Octylene	$C^{16} H^{16}$	240°		
Nonylene	$C^{18} H^{18}$	284°		
Decatylene	$C^{20} H^{20}$	320°		
Endecatylene	$C^{22} H^{22}$	384°	0.782	50°
Dodecatylene	$C^{24} H^{24}$	421°		
Decatritylene	$C^{26} H^{26}$	455°	0.791	48°
Cetene	$C^{32} H^{32}$	527°		
Cerotene	$C^{54} H^{54}$		Solid.	Solid.
Melene	$C^{60} H^{60}$	707°	Solid.	Solid.

THE YIELD OF DIFFERENT PRODUCTS.

The yield of the different products from crude petroleum varies greatly in different refineries. The following is a fair average for Pennsylvania oil of about 45° B.:

Gasoline	1½
Refined naphtha	10
Benzine	4
Refined petroleum or kerosene	55
Lubricating oil	17½
Paraffine	2
Loss, Gas, and coke	10
	100

By cracking, the same oil could be made to yield:

Crude naphtha	20
Burning oil	66
Coke and loss	14
	100

PRODUCTS OF THE DISTILLATION OF CRUDE PETROLEUM.

(*Price of the Crude, in Bulk, 14 cents per Gallon.*)

Name.	Percentage yielded	Gravity Beaume.		Price per gallon In bulk.	Price per gallon Retail.
			Uncondensed, Loss.		
Chymogene		110°	Condensed by pump, made by one firm only, for an ice machine, boils at 32° F.	$1.50	
Rhigolene		100°	Condensed by ice and salt, proposed as an anæsthetic, boils at 65° F.	$1.00	
Gasolene	1½	85° to 90°	Condensed in worm by cold water used in "air gas machines" and gas "carbonizers."	35 cts. to 18 cts.	
Naphtha	10	71° to 76°	For *oil cloths*, cleaning, etc.; so-called "safety-oil," "Danforth's oil," "American Safety Gas," etc.; for adulterating kerosene; cleaning oil wells.	7 cts. to 5 cts.	12 cts. to 20 cts.
Benzine	4	62° to 65°	For paints and varnishes	16 cts. to 12 cts.	20 cts. to 16 cts.
Kerosene or refined Petroleum	55	46°	Ordinary oil for lamps	20 cts. to 25 cts.	30 cts. to 40 cts.
Paraffine oil	19½	30°	Semi-solid when cold. Chilled and pressed to separate paraffine, oil used for lubricating	18 cts. to 14 cts.	
Coke, Gas, and loss	10				
Total	100				

On a New Hygrometer.

By W. O. Whitehouse.

[Read before the Royal Society.]

The use of Mason's wet-bulb thermometer as a means of hygrometric measurement, though it be admitted to be the most practically useful, and indeed the only recording instrument for the purpose, has yet this serious inconvenience, not to say defect, viz., that its indications either cease or are valueless at temperatures below 32 deg. F.

In a conversation which the writer had with the director of the Meteorological Office some months ago, the question arose whether anything could be suggested to remedy this inconvenience.

It was obviously inadmissible to substitute any other fluid for, or to make any addition to, the water employed for the wet bulb, as then it would cease to be a test for the purely hygrometric capacity of the air. It became therefore neccssary to fall back in another direction, and to find some hygromt tric body which [should readily and rapidly absorb moisture from the a r, and at the same time afford some means of measuring and recording the amount of such absorption.

Fused chloride of zinc or of calcium seemed promising, as very active agents, absorbing rapidly on their surfaces, and allowing the readiest possible escape of the fluid hydrate for measurement, yet no means presented itself either of accurately measuring, regulating, or maintaining the exact extent of surface exposed for absorption; nor could the substance itself be easily renewed when required, nor, indeed, could either of these substances be regarde d as wholly free from the interference of frost, as the moisture absorbed [from the atmosphere at a temperature much below freezing-point may remain frozen on the surface, and become incapable of continuous measurement. It seemed essential to the accuracy and practical utility of any instrument designed for this purpose—

1. That a fixed and invariable extent of surface should at all times be exposed for absorption of moisture.

2. That the apparatus should be simple, inexpensive, and not inconvenient in use.

3. That the hygrometric substance should be continuously and steadily renewable; and above all, if it were possible,

4. That the measurement should be effected thermometrically.

No solid hygrometric substance seemed capable of meeting these requirements; but all the conditions seemed likely to be fulfilled by tho use of concentrated sulphuric acid. This would admit of being spread in an exquisitely fine film over the surface of the bulb of a thermometer bp means of a glass capillary syphon, of which one end should rest on the upper part of the bulb, while the other end dipped into a reservoir of the acid. A continuous supply could be maintained for any required length of time by suitable arrangements. The absorption of moisture would necessarily be attended by a rise in temperature, and this would be proportioned to the amount of hygrometric moisture absorbed; while the hydrated acid, having fulfilled its office, would fall in drops from the bulb into any tube or reservoir placed for the purpose.

An instrument has been constructed by the writer to test this principle, which has, by the courtesy of the director of the Meteorological Office, been under observation for some weeks.

It consists essentially of three thermometers of similar construction, and used as a "wet bulb," a "dry bulb," and an "acid bulb," respectively placed side by side on a suitable frame, and read together for comparison

The experience already gained in the use of this instrument has shown that, with a reservoir of proper construction, the supply of acid may be made continuous for any required length of time, and that, from the very slight variations of flow which occur in its action, the supply to the thermometer will be sensibly equable

The length of the syphon, and the size of the capillary bore, together with the difference of level between the surface of the fluid in the trough of the reservoir, and the point of delivery on the bulb, will determine the rate of supply of the acid.

It is clear that either a too rapid and continuous stream of acid at the temperature of the air, or a too scanty supply, would diminish the readings; yet it is found that practically there may be a pretty wide range of variation in the supply of acid, within which no essential change in the sensibility of the instrument is noticed.

For a bulb having one square inch of surface one drop per minute is sufficient, though the time may range from 40 to 1000 seconds without inconvenience, the time being noted, as the hydrated acid, after having fulfilled its office, falls drop by drop from the bulb.

The quantity of acid required at this rate is about 3 fluid ozs. per diem, or one imperial pint per week, which is procurable of uniform density, sufficiently pure and free from lead, at a cost of 2½d.

The temperature of the acid in the reservoir is of course that of the surrounding air; the elevation of temperature shown by the acid-bulb thermometer is due to, and seems to be strictly a measure of, the amount of moisture absorbed by the film of acid spread on the surface of the bulb, say one square inch, continuously supplied in its concentrated state, and as constantly passing off hydrated.

While, therefore, this instrument is, like Mason's, intended to measure the amount of hygrometric moisture in the air, and to do so thermometrically, it yet is, in its principle, and in its operation, essentially of an opposite character.

The ordinary wet-bulb thermometer is at the zero of its scale in an atmosphere of perfect saturation, and its action depends upon the amount of sensible heat absorbed and rendered latent by evaporation of the water from its surface.

The acid-bulb thermometer is at its zero in a perfectly dry atmosphere, and its action depends upon the amount of latent heat rendered sensible by the condensation of vapor into water on the surface of the bulb, and by the combination of this water with the concentrated acid.

It would appear that a hygrometer on this principle is entirely free from the action of frost; while its sensibility is so great as to be at first almost embarrassing.

This may, however, be easily regulated and toned down, if necessary, to any required range by the dilution of the acid with glycerine, a fluid which is also of itself hygrometric, though its thermal effects are far less marked than those of sulphuric acid.

It will require a most careful series of observations to elicit all the points noteworthy in the new instrument, and to determine the relative values of the wet and acid-bulb readings, noting the behaviour of each at every part of the scale, from absolute dryness to saturation, and at temperatures ranging from 75° or 80° down to 0°.

This will be necessary befere the instrument can aspire to take its place among the recognised, standards of meteorological science; but in the meantime the writer has been advised to offer, at the earliest time, a brief description of it to the notice or the Royal Society.

Lightning and Gas Pipes.

[In our issue of March, 2d, p. 70, we copied a communication by Henry Wilde, which called out the folfowing, to the same Society.]

NOTE ON THE DESTRUCTION OF ST. MARY'S CHURCH, CRUMPSALL, ON THE 4TH OF JANUARY, 1872 BY FIRE FROM A LIGHTNING DISCHARGE.

By Joseph Baxendell, F.R.A.S.

The interest taken in the question as to the cause of the recent accident by lightning to St. Mary's Church, Crumpsall, induces me to submit to the Society the following results of a careful examination of the lightning conductor, spouts, gas-piping, etc., at the church and rectory, which I made on the 27th ultimo.

The lower part of the conductor passes through an iron down-spout, and terminates in a common drain-pipe at a distance of only three feet nine inches from the lower end of the spout, and at a depth of only about 18 inches below the surface of the ground. It has, therefore, no direct connection with the earth, and is, in consequence, absolutely useless for the purpose for which it was intended. The iron down-spout through which the conductor passes, received the end of a lead gutter, which extended the whole length of the church to the top of a similar iron down-spout built in the wall inside the rectory, and connected with another iron spout outside the wall by a leaden bent pipe. This leaden bent pipe was above the floor of the vestry, and at a distance of 18 inches from it, and below the floor, there was a lead gas-pipe connected with the large gas-meter, which received its supply from a main laid in the street leading to the rectory. There was a small meter under the tower, but no part of the piping connected with it approached the conductor, the spouts, or the lead gutter, within a less distance than three feet.

Assuming, then, that the lightning struck the top of the conductor, its course would be through the lead gutter to the iron down-spout in the vestry, and then by a disruptive discharge from the lead bend to the lead gas pipe under the floor of the vestry and through the meter to the street main. The lead gas-pipe would be melted and the gas ignited, and it is very probable that the disruptive discharge from the lead bend would also ignite any inflammable materials that might be in that corner of the vestry.

When the discharge arrived at the gas main in the street, part of it would pass down the main in a westerly direction and part up the main to the supply pipe and meter at the rectory. Here a small lead pipe passed from the meter for a short distance along the ceiling of the cellar, and in its course came in contact with an iron water supply pipe; the discharge melted part of the small lead pipe, ignited the gas, and finally passed off through the water supply pipe into the main in the street.

I have assumed that the lightning struck the top of the conductor, but I must state I was unable to discover the slightest trace of any action tending to support this view; and it is at least equally probable that the stroke fell directly on the top of the iron down-spout at the east end of the church. It is stated that the bell in the tower was heard to ring at the time of the discharge; but the mere passage of the electric fluid down the conductor would not affect the bell, and the concussion of the air from a discharge on the top of conductor would act upon the tower in a vertical direction, and would not, therefore, be likely to give the bell a swinging movement. If, however, the discharge was directly on the spout at the east end of the church, then the concussion of the air would act laterally upon the tower in an east and west direction, and, as the bell swings on an axis lying north and south, it is quite conceivable that an oscillating movement might be given to it sufficient to cause it to ring. In either case, however, whether the discharge took place upon the top of the conductor or on the top of the down-spout in the vestry, the ultimate results would be precisely the same. Had the conductor been directly connected with the gas main, as suggested by Mr. Wilde, the accident to the church would have been prevented, but not that at the rectory. The practical conclusion, therefore, to be drawn from a consideration of all the circumstances of this disastrous occurrence is that, in towns and districts where systems of gas and water mains and pipes exist, all lightning conductors should be directly connected with the mains of both systems. Had this been done at St. Mary's Church no accident would have occurred either to the church or the rectory.

On the Style of Gas Burner for Bending Glass Tubes.

By Dr. H. Carrington Bolton.

The *American Chemist* for January (Vol. II. No. 7 page 224) contains a note by Prof. J. Lawrence Smith, "On Bending Glass Tubes for Fitting Apparatus," in which he recommends a Bunsen burner flattened at its extremity so as to give a thin broad flame. This is certainly a great improvement on the commonly employed burner, but an ordinary fishtail or batwing gas burner will be found to give, if possible, still better results. The writer has employed for some years an ordinary batwing burner attached to a small short stand (three inches high, burner included) so as to rest low upon the table in order that raising the arms inconveniently high may be avoided. Such a burner insures a broad flame, by which the tube is heated for two or more inches in length; the tube is turned while in the flame, and removed for bending as usual.

The deposit of carbon, which at first sight might seem an objection, is really one of the chief advantages of using this burner. On placing the glass in the flame the deposit begins immediately and prevents too rapid a rise of temperature and consequent cracking of the glass: during the heating the carbon tends to distribute the heat equally over the surface of the tube; and finally on withdrawing the glass from the flame too sudden cooling is prevented and the glass is as it were annealed.

The black deposit is readily removed by a dry cloth. This plan was commonly employed in Homffann's Laboratory, Berlin. In bending tubes of more than three eighths of an inch in diameter, one end should be closed tightly with a cork (or wax) and air blown into the other end at the moment of bending the tube; by regulating judiciously the pressure of the air upon the sides of the somewhat softened tube, the latter will neither bulge out nor collapse, but will re-

tain its proper caliber. This cannot be effected however with very large tubes, or with very thin ones, which require the nice manipulation of the professional glass blower.—*Am. Chemist.*

Note on the Preparation of Marsh Gas.

By Charles A. Brinley.

As Marsh gas has the reputation of being rather inconvenient to prepare, it may perhaps be of service to some who have never had occasion to make it, to be in possession of more precise directions than are ordinarily given in the handbooks.

The following method and proportions yield 15—20 gallons (125 litres) with comparatively little trouble. 750 grms. of caustic soda are put in an iron pot and warmed over a slow charcoal fire in a common wind furnace, with about 800 c.c. of water until dissolved; an equal weight 750 grms. of commercial acetate of soda is then added, which goes into solution without more water. The pot is now lifted from the fire and 1·25 k logrms. of coarsely-powdered quick lime introduced. The lime slakes with violent ebullition, but if the top of the pot is covered with a piece of board the loss is trifling. Upon the slaking of the lime the mass becomes comparatively dry, and may be dried still further over the fire until it breaks readily to pieces. It is then transferred to a sheet iron retort prepared at a tinman's as follows:*

A frustrum of a hollow cone is made with a diameter of 42 c. at the base, 5 c. at the top and 40–45 c. high, the opening at the top spread a little with a mandril so as to admit a cork easily. A flange turned up round the base, and a bottom put on by lapping its edges over the flange. The construction is shown in vertical section below.

The joints should be made upon a wheel, as tight as possible, without solder or rivets, and washed inside and out with a thin paste of plaster of Paris, with which indeed the whole interior of the flask may be coated. When fitted with a light cork holding the delivery tube the whole is set into a charcoal fire and heated to full redness. Gas will begin to come off almost immediately and may be collected over water in small quantities and tested by ignition with a match. When it burns quietly with a yellowish blue flame connection may be made with a gas bag or receiver, and the process proceeds without interruption. It is well to interpose a wash bottle between the retort and receiver so that any water distilling over may be intercepted, and to keep a moist cloth about the neck of the flask to prevent the cork from burning. The reaction is as follows, $C_2\,H_2\,O_2\,Na + HNaO = Na_2\,CO_3 + CH_4$, and yields according to Dumas,† who first described the foregoing process, perfectly pure marsh gas, which burns with a yellowish flame.—*Am. Chemist.*

The Supply of Croton.

A PROTEST AGAINST ITS BEING REDUCED.

Commissioner Van Nort has sent a communication to the Legislature protesting against the repeal of the act of 1871, conferring authority for increasing the supply of water. He says that the city has always been benefited by the increased supply, as seen in improvements in lofty buildings, a more efficient fire department, and an improved sanitary condition. He continues: "I respectfully call the attention of the Legislature to the important fact, as this department is by law made responsible for 'the supply of water, and charged with the execution of such measures as may be necessary to preserve and increase the quantity of water and keep it pure,' and I respectfully remonstrate against the pending bill as being franght with mischief and danger, and as being uncalled for by any consideration of private rights. The landowners whose property is subjected to its provisions are respectively protected in their rights by the law of 1871, which gives them ample remedies and an appeal to the highest courts. I respectfully suggest that the acts of 1871 be so amended that all judicial proceedings be had in the Second Judicial District, and that all power under said acts cease January 1, 1872, as in the meantime the storage reservoirs now being constructed on the west branch of the Croton River will be ready for use. The one on the middle branch can be completed within three years. With these two storage reservoirs in use, covering an area of over 800 acres, there will be no necessity of drawing water from the natural lakes and ponds in the water-shed district."

* An idea of President Morton of the Stevens Institute.

† Ann. Chim. Phys. lxxiii. 93.

The Winter of 1871-2 in the Northwest.

The following table gives the average temperature during the past winter (1871–2), at the points named. Except in two instances, the figures are furnished by the United States Signal Office at Washington, and represent three daily quotations of the thermometer at each place—morning, noon and evening:

	Dec. '71.	Jan. '72.	Feb. '72.	Mar. '72.	Mean.
Louisville, Ky....	35°	33°	33°	35°	34
St. Louis, Mo.....	31	29	32	36	31¼
Chicago.....	23	27	26	29	26
Baltimore.....	30	35	36	33	33¾
Philadelphia.....	30	29	32	28	30
Washington.....	33	33	34	33	33
New York.....	30	30	30	29	29½
Helena, Montana.	18	26	34	42	30
Kalama, W. T....	31	32	44		36

The temperature at Helena, Montana, may properly be taken as a fair average for the territory, and hence for the mountain section of the Northern Pacific Railroad, where climatic difficulties should be encountered if anywhere. Helena is on the general route of the road, directly in the mountains, and but a few hundred feet below the highest point on the line. Notwithstanding the past winter has been the coldest ever known in Montana, and a surprise to the people, it will be observed:

1. That the average temperature at Helena (latitude 46½°) for the four months, was the same as that of Philadelphia, although the latter city is 4,200 lower and 450 miles further south.

2. It was four degrees warmer at Helena than at Chicago, and only three degrees colder than at Washington.

3. During February and March it was much warmer at Helena than at Philadelphia, Louisville, St. Louis or Washington. During March it was nine degrees warmer at Helena than at Washington and Baltimore.

4. The average winter temperature at Kalama, Washington territory, on the finished portion of the Northern Pacific Road. (in latitude 46°), was several degrees warmer than at Louisville, Washington or Baltimore, in latitude 39°. The greatest cold of the past winter at Kalama was 14° above zero.

Letters from members of the Montana territorial government, dated March 6th, state that for three weeks previous to that time (beginning about the middle of February) the weather had been so mild that all signs of winter had disappeared: farmers had put in nearly all their spring grains crops, and new grass was three inches high in the valleys. The significance of this can be appreciated when it is remembered that in the Atlantic States, as late as March 6th, intensely cold weather and heavy snows prevailed; trains were blockaded on many eastern roads, and up to the 2*d of April* frost had not left the ground in Pennsylvania, and the grass had not shown the slightest tinge of green.

These simple facts, mainly derived from official sources and easily verified, are the strongest possible corroboration of the statements hitherto made by the promoters of the Northern Pacific Railroad as to the climatic advantages of the valley route across the continent.—*Philadelphia Inquirer*, April 6.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Gas News from Paris.

New York, April 8, 1872.

Mr. Editor: Thinking the following article, which I find in the Paris *Figaro* of March 18, 1872, may be of interest to you and your readers, I take the liberty of sending the translation without any comments.

[*Le Figaro*, March 18, 1872.[

In yesterday's sitting, the City Council approved a treaty by which the Parisienne Gas Company advances to the Prefecture of the Seine the amount of seven millions and a half francs ($1,600,000 gold), payable on the benefits to come.

This operation is nothing but a special loan, in provision of liquidation for the budget of 1872.

But to provide for all emergencies, it has been decided, that should a tax be put on gas, or in case of adaptation of a new system of lighting, the city will be bound to liquidate the debt, *hic et nunc*, either in specie, or by means of bonds, created for that purpose. This means in case of the oxyhydrique gas having any chance of being adopted.

The question is not settled, and not later than yesterday Mr. Leon Say has informed the City Council that the experiments are not terminated. and that the ultimate report prepared by the city engineers, cannot be ready before the end of the month.

As the report has been circulated among some people, that the city of Paris and many others were lighted by the oxhydrique gas, the above article will show that as yet it is only an experiment, with little hope of success.

Should you think proper to publish the above, I would request to have my name omitted, not wishing to enter into a newspaper controversy.

Very respectfully, ***

Sensitive Flames.

By Isaac Norris, M.D.

The arrangement of Barry for rendering a flame sensitive is well known, and offers the great advantage of using the gas at the ordinary pressure, so that the experiment is arranged in a moment. The size of the pin-hole aperture determines the height of the flame burned above the wire gauze. I have found after many experiments that it is rendered much more sensitive by using a chimney—an ordinary glass one, such as employed with the argand burner, answering perfectly and rendering the flame at the same time much more steady. It may rest on the gauze, which must be placed at the proper height above the burner. The gas should be burned on until it begins to flare, and then lowered a little until it becomes steady. The nearer it is to this point the more delicate the result. Tyndall's caution with regard to obstructions from stop cocks, etc., is also very important. Wishing to measure the height I attached a small scale to the chimney, and found, as recorded, that the flame is much more sensitive to some sounds than others. Any sound in which the letter *s* enters seems to effect it particularly. Attaching a telescope to the apparatus, something like the arrangement in a cathetometer, I found that even when the flame appears to the eye perfectly steady, it was continually varying in height—sounds that were quite inaudible to any one near it, evidently producing a marked result.

A tall flame, six to eight inches in height, is not as sensitive as one of only two or three inches, and placing the gas in a bag at the same pressure as it issues from the pipe did, not alter the result. The whole subject is a very curious one, and I am inclined to think this flame is *the most delicate* yet produced, despite the accounts of the wonderful steatite burner of which Tyndall speaks. An illustrated description appears of Barry's sensitive flame in this Journal for January, and it is to be hoped the present little article may lead to other experiments in the same direction.—*Jour. Franklin Institute.*

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 91, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS and other buildings. Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity, Retort Settings, Condensers, Washers, Exhausters, Purifiers, Holders, Coal Hoisting Apparatus, Iron Roofs, and every description of Machinery required in the Manufacturing of Gas.

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Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Blowers for Forgers,
Pumps for Water, &c., &c.

REFERENCES:

CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
SAMUEL DOWN, President American Meter Company, N. Y.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
CHARLES MOWTON, Engineer New York Gas-Light Company, N. Y.
SAMUEL P. PARHAM, Engineer Mutual Gas-Light Company, N. Y.
Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL.
HENRY J. DAVISON, Engineer, 77 Liberty Street, N. Y.
HERRING & FLOYD, Oregon Iron Foundry, 738 Greenwich Street, N. Y.
FREDERICK SABBATON, Engineer Troy Gas-Light Company, Troy, N. Y.
Col. WHITE, Engineer People's Gas-Light Company, Williamsburgh, N. Y.
GEORGE W. PARSONS, Sup't and Eng'r, Rochester Gas-Light Co., Rochester, N. Y.
GEORGE W. EDGE, Engineer, Jersey City Gas-Light Co., Jersey City, N. J.
J. H. GAUTIER & Co., Fire Brick Works, Jersey City, N. J.
Professor SILLIMAN, New Haven, Conn.
JOHN HARRISON, Engineer People's Gas-Light Company, Baltimore, Md.
CHARLES FABEN, Superintendent and Engineer Toledo Gas-Light Co., Toledo, O.
PETER F. BURTIS, Supt. and Engineer, Chicago Gas-Light Co., Chicago, Ill.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [351-

A REVOLUTION

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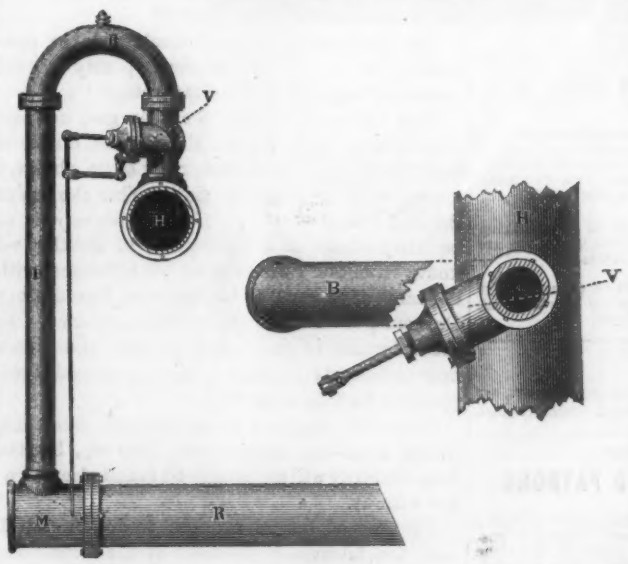

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☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

TUESDAY, APRIL 16, 1872.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

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FALSE WITNESS.

An accident, which, at the time, gave us some concern, has turned out luckily, in furnishing an opportunity for some remarks of a timely character, upon one of the "signs of the *Times*."

The circumstance referred to was an omission, due to unexpected absence, to append some intended comments, at the time, to a letter signed "Wm. E. Demarest, No 25 West 23d St., New York," transferred from the *Daily Times* to our issue of March 16th (page 86). Such omission, as was to be anticipated, has led to misconception, involving the imputation of a *quasi* endorsement, by this Journal, of the views and statements of the said Demarest. We repeat that all this has been lucky, as it gives us now the chance to refute, with more emphasis and significance, the inaccuracies of the *Times'* correspondent, and demolish some of his reckless and slanderous accusations.

His first assertion is that Philadelphia has furnished to her citizens, by her municipal gas works, gas "of about eighteen candles, at $1.50 per thousand feet." *Per contra*, we have before us the *Public Ledger*, of Philadelphia, of March 12th, 1872*, with a leader, full of bitter strictures upon the management of their Gas Works, and upon their Annual Report of the Trustees, for 1871, comprising the complaint that there is "not one word as to what was the actual cost last year of *manufacturing* a thousand feet of gas, for which consumers pay $2.30."

The *Ledger* man, being himself a large consumer, his testimony, of course, may be set against that of the *Times* vituperator.

That Philadelphia has 18 candle gas, we shall not believe, until we see the figures, obtained upon the Bunsen photometer, by some observer possessed of the requisite skill. That the gas of the Manhattan Gas-Light Co., of this city, is to be fairly valued at an average of 13 candles, we know, from our own *personal* observations, with the same apparatus, to be fictitious, Demarest or Doremus, to the contray notwithstanding. In the interests of truth and justice, the writer here deliberately makes himself personally responsible for this refutation.

Stern duty compels these personal allusions, which none can regret more than we, but the responsibility will ultimately be found elsewhere; not with us.

To proceed (as we propose to do) in detail, with the farrago of *falsehoods* of the *Times's* correspondent. He speaks of "respectful investigation," and "gentlemanly manner," and so on; alluding to the habitual treatment of consumers by the Philadelphia authorities. We shall therefore repeat here a paragraph written by a Philadelphian, our friend Dr. C. Elton Buck, editor of the *American Exchange and Review*, and formerly editor of this Journal; an authority which probably Demarest himself will respect:

"In this country as in England, gas companies are usually private corporations, the exceptions to this rule being Philadelphia, Alexandria, and Richmond, Va., and Frankfort, Ky., where the gas works are owned and operated by municipal authorities, or by trustees, to whom their management is delegated. In considering the question whether it is more desirable for the consumer to be dependent on a municipal or a private corporation, opinions are divided; but experience has proved that if there is any difference in the practical results, it is not in favor of municipal management. In all cases the same rules of selling gas are observed; the same meters are used, and the same apparently arbitrary methods of treating delinquent consumers, or their successors, are followed. Gas companies are always made the targets at which are aimed the shafts of indignant consumers; and no matter whether these are served by private corporations, the results are always the same."

"Ring-ridden Brooklyn" gives us our next point. The aborigines of this locality will doubtless be much pleased with the new gas-tariff established for them by Mr. Demarest; our own advices being that, instead of $2.50 per thousand, which he informs them they pay, they themselves have been heretofore under a *very strong* impression that they pay $3.25. [The Brooklyn City Gas-Light Company charge this latter rate to private consumers, and $2.75 on their city contract, for street lamps. The other Brooklyn companies, we are told, with the single exception of the Peoples, find it necessary to charge *still more*.

As to the statements of Demarest about the cost of gas in British cities, we can but say that these figures are scarcely less underrated than the others we have quoted. In point of fact, we find it will be impossible for us to crowd in, on this occasion, a tithe of what we wish to write about this this tissue of malignant rubbish.

We shall skip over therefore to the last sentence. He says the stock of the Manhattan Company cannot be bought for *four times* its face. Some *was bought* about a month since in the Broad Street Exchange, for $218, little over what our friend Demarest will give for it. Hadn't the "bulls" better consult with him? He must know a trick worth two of theirs.

We keep room for a last paragraph, while on this subject, in relation to parties whom we hold in much greater respect. Why should our friends of the *Scientific American* have thrown into their last issue such an inconsiderate statement as this: "The present price of gas here is $3.50 per thousand cubic feet; in Pittsburgh, Pa., $1.80." (Demarest, by the way, knocks off *a dollar more* for the Pittsburghers.) Our contemporary ought certainly to have supplemented his statement, and made it fair, by adding that in Pittsburgh gas coal is a "drug," almost as cheap as dirt. We respectfully suggest to our neighbor, to whom we are indebted for courtesies that we freely acknowledge, that if he *will* "slide on our cellar door," he should do so openly and honorably. He will meet reciprocation on our part. *Fair play* is what we shall insist on.

* For directing our attention to this, we are indebted to A. C. Ross Esq., of the Gaslight Co. of Zanesville, Ohio.—ED.

THE INVENTIONS OF MR. HAVENS

Those of the fraternity, who have visited of late the works of the Brooklyn City Gas-Light Co., have seen in operation some most ingenious devices of A. F. Havens, Esq., the accomplished Engineer of that Company; and have doubtless been as much interested thereby as the Editor himself was, on the occasion of a recent visit. Of this apparatus we are enabled this week to present a fine pictorial representation on the first page, which, with the accompanying specifications, will enable any practical man to understand its mode of operation and its great advantages.

The general subject of the views, now rapidly making way throughout the gas world, of the detrimental agency of the hydraulic seal in the main, has been discussed by us repeatedly before. The fact is, that the rapid spread of the belief that the first introduction of the seal was an advance backwards, which should now be retrieved as soon as possible, has almost the significance of a *revolution*, in the hitherto intensely conservative realms of gas. That this Journal should have been a chief leader in this revolution, and at a time when the proposition of doing away with the water seal—an institution which

had so long been one of the household gods of the gas-house—met with naught but ridicule and scorn, is glory enough for us; and at the same time highly encouraging for the future.

Particularly encouraging is it for the future of our art, and science, in America, when we find men of the experience and position of Mr. Havens, not only throwing aside the prejudices in which they have been educated, but also advocating reforms, and devoting great skill and inventive faculty themselves, to perfecting the details of carrying such reforms into practice.

Mr. Havens's combinations certainly exhibit eminent practical ingenuity; and our own observations on the spot made it perfectly plain that the high claims he sets forth, of simplicity and certainty of operation, are correct and justifiable. In fact it is hard to see how the most stupid or stolid operative could contrive to make any mistake.

The machinery, while extremely simple and strong, is adjustable to suit every possible emergency. Even were the rods to be greatly bent, (purposely or accidentally), the joints and adjusting screws will at once bring everything back to its place, without interruption or delay. The seal may also be readily changed, in case the exhauster should suddenly stop working.

It must not be forgotten also that Mr. Havens combines in his plans a new and highly-valuable mode of closing retorts, in itself of no small importance, but which he shows to be essential to the completeness of his system. He gets rid of all lutes, labor in luting and handling, duplicate retort-lids, and wear and tear and risk of fracture of lids in handling. The lids turn on one side, as on a hinge, and are almost free from possibility of injury; while from our own observation, leakage at a lid is a thing scarce known. The re-entering joint, moulded in cement, seems in fact, on examination, to be in itself a most admirable invention, and should be universally adopted.

We shall make other visits soon to the scene of Mr. Havens's operations, and report thereon further in future issues.

THE OHIO GEOLOGICAL REPORT.

To the eminent geologist, Prof. Newberry, the conductor of this survey, we owe a copy of the Official Report for 1870. Our interest is chiefly centered, of course, on behalf of our readers at least, in what he informs us regarding the great coal-fields of Ohio. These coal-fields are, in fact, next to the bituminous regions of Pennsylvania, those which are probably of most practical importance to the gas fraternity in the Eastern and New England States.

The State of Ohio is mostly underlaid with coal, and there is a seam of *cannel*, which has interested us much during the year last past, samples having in fact been put in our hands for examination, the results of which examination was duly laid before the readers of the Journal.

In Dr. Newberry's report, there is a great mass of information about the mineral fuels of Ohio, which we find will take much time and labor to digest, and put into a shape acceptable and available for our readers. This labor, however, we shall not grudge, and in our next issue, shall commence introducing abstracts of those portions of this important report which are of special concern to us.

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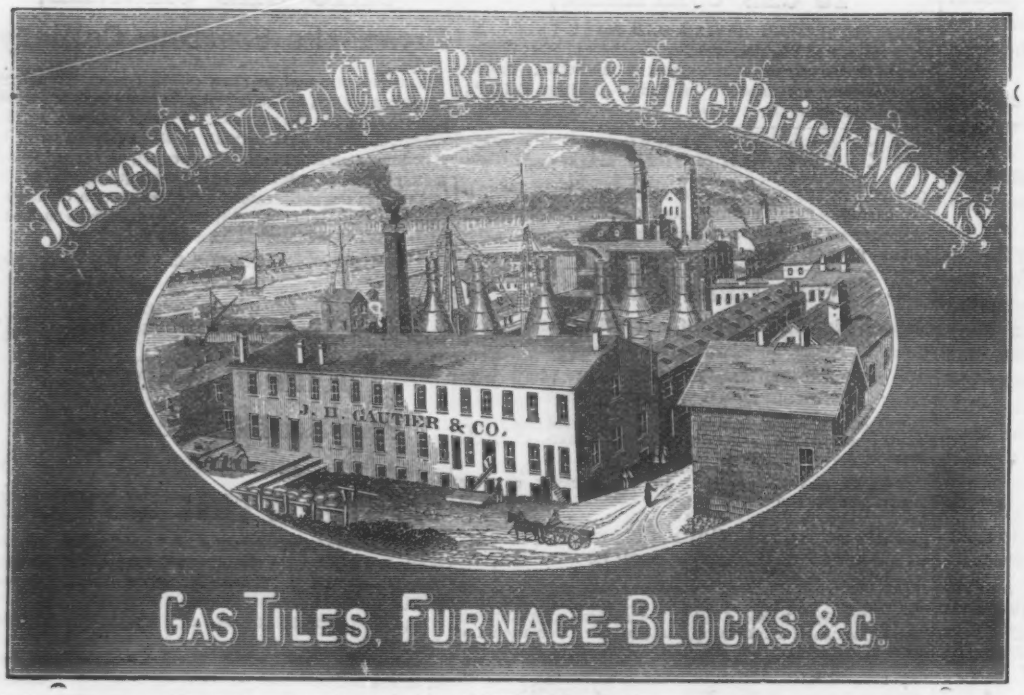

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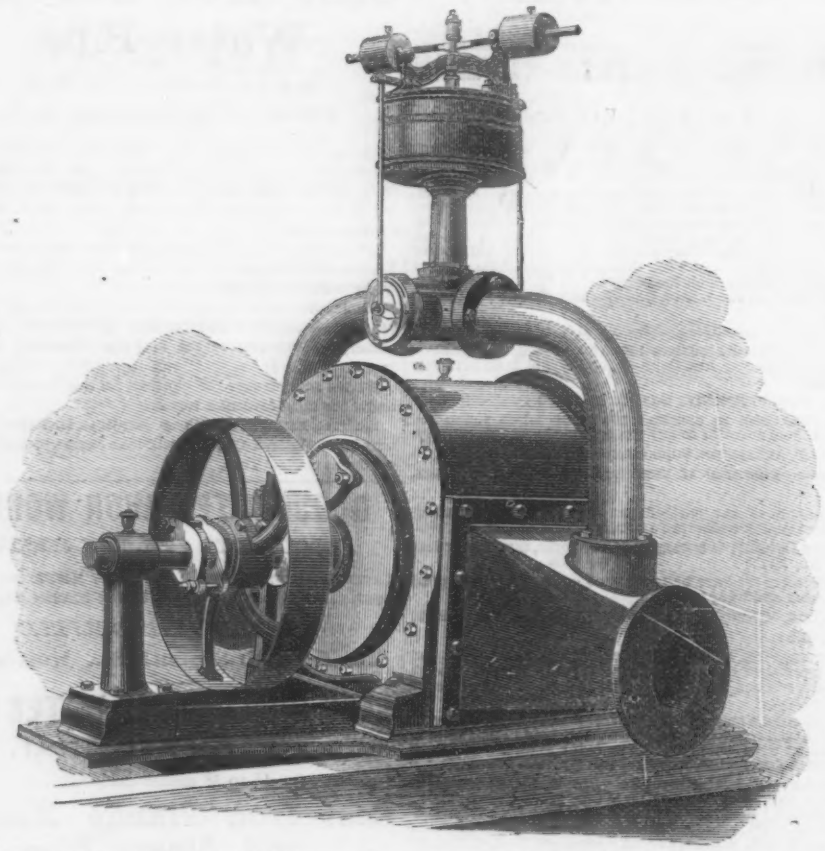

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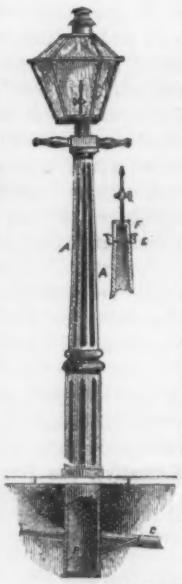

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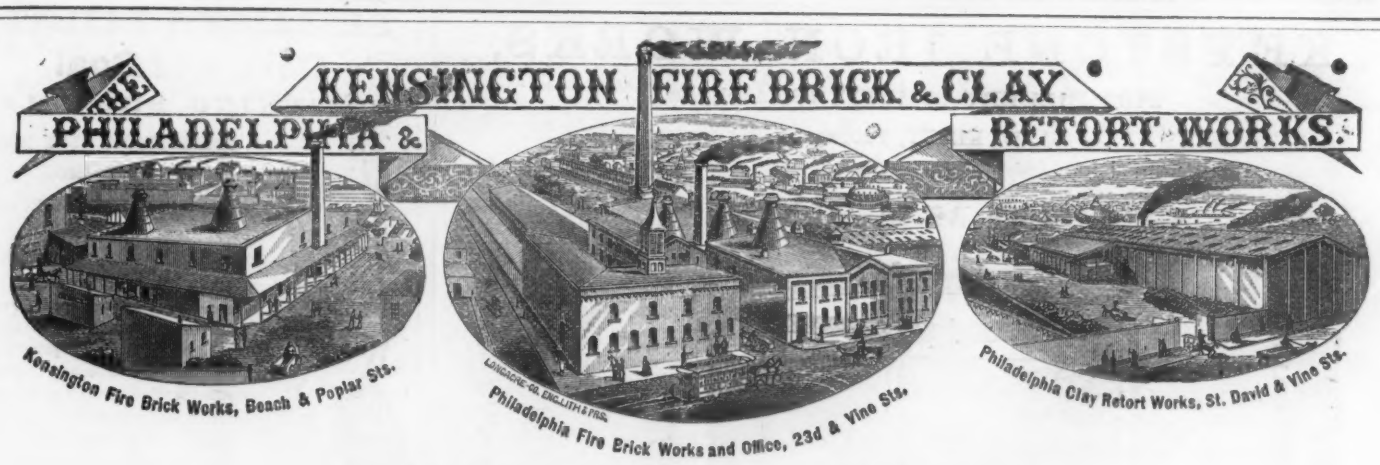
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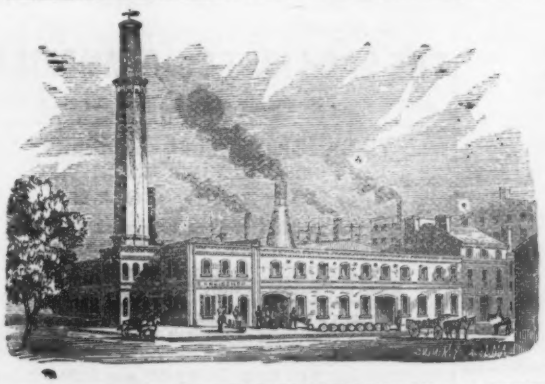

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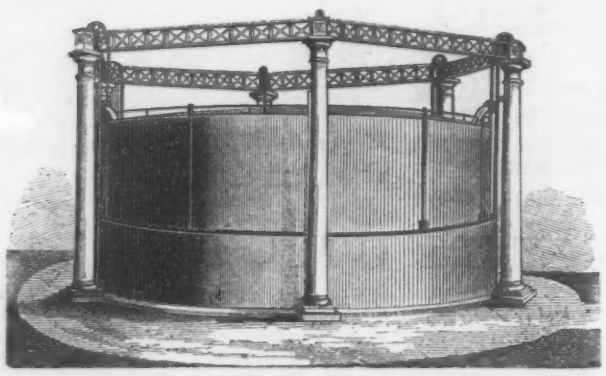

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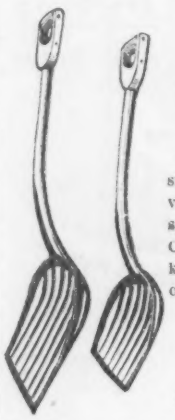

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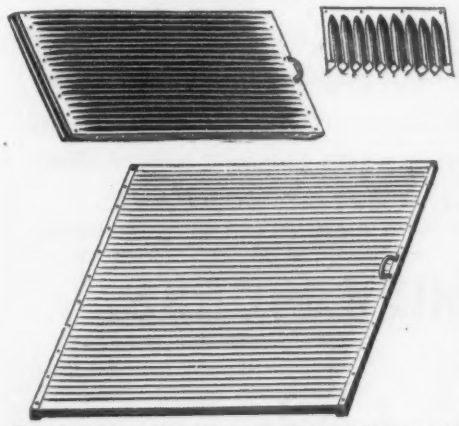

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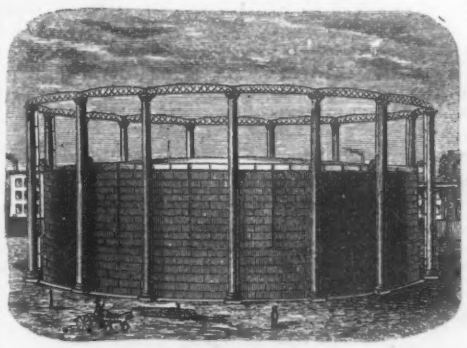

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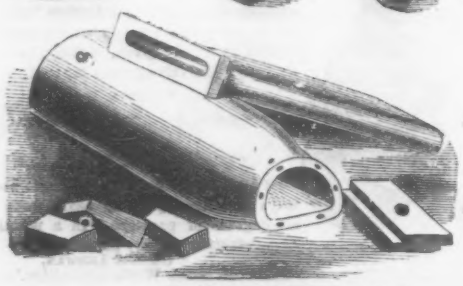

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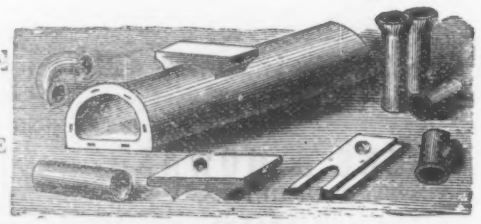

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To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Indicators, Photometers, and all kinds of Gas Apparatus; Also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 20 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

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NEW IRON COMPOSITION

Has purified, per bushel, on a single test, 10,000 feet of Westmoreland Gas. With revivification lasts indefinitely. Surpasses in POWER and ECONOMY all known materials. Saves largely in FIRST COST, SPACE, LABOR, SUPERINTENDENCE, and all current expenses. Will purify *easily* sulphurous gas, wholly *unmanageable by lime.* Takes out *all the ammonia.* Now operating in the following Gas Works: Harlem; New York (21st street); Port Morris; Hunter's Point; East New York; Worcester, Lynn and Cambridge, Mass.; Lewiston, Maine; St, Albans, Vt.; Pawtucket, R. I.; Meriden, Ct., and being introduced in many other places.

Cost 70 cents per bushel. One bushel for each square foot of Purifier sufficient. Rights to use for life of Patents, for daily makes of gas in thousands; under 25,000 $200; under 50,000, $400; under 100,000, $500; $250 additional for each additional 50,000 per day.

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☞ Immediate arrangements are urged, as the demand for he prepared composition is increasing *so rapidly* that delays supply may occur.

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VALVE WATER METER.

(Used also for Oils and Liquors.)

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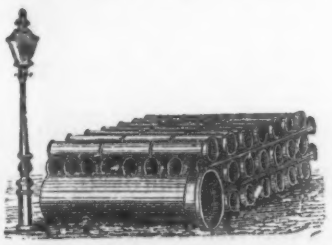

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We have on hand here several thousand feet of small Pipe from which we can ship orders readily to any part of the country.

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No. 173 Broadway, New York,
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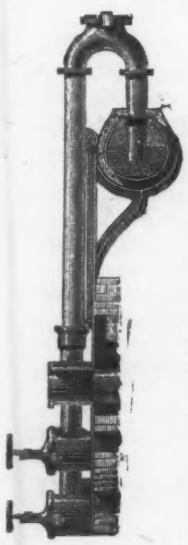

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Bench Castings,
Air and Immersed Tubular Condensers,
Improved Dry Scrubbers,
Purifiers with Imp'd Dry Centre Valves,

and every description of apparatus necessary for large or small Gas Works.

The designs for our apparatus are furnished by JAMES H. WALKER, Engineer and Superintendent Milwaukee Gas Works, who can be consulted on all matters relating to the working, erection of new, or extension of old works.

Parties employing us will find their orders promptly attended to, and satisfaction guaranteed in all cases.

The best references given on these points. 244-6m

S. FULTON & CO.,

PLYMOUTH IRON WORKS,

CONSHOCKEN, PA.,

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PIG IRON & CAST IRON GAS & WATER PIPES.

Also, Heay and Light Castings of every description.
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Associate Editors: Profs. Gray and Gibbs of Cambridge, and Newton, Johnson, Brush and Verrill of Yale.

Devoted to Chemistry, Physics, Geology, Mineralogy, Natural History, Astronomy, Meteorology, etc.

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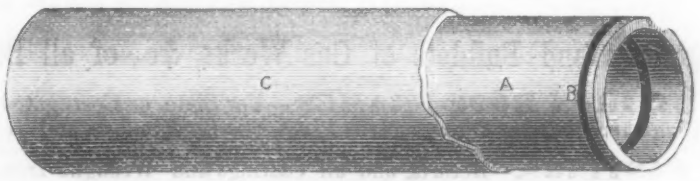
WORKS, AT BAY CITY, MICHIGAN.

CHICAGO OFFICE, 646 WABASH AVENUE.

SECTION OF GAS PIPE.



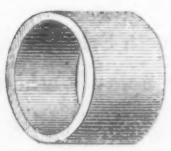


FIG. 2.

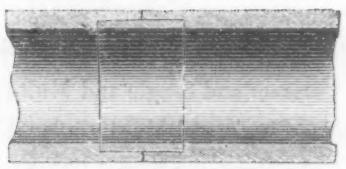


FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.
FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

Above is a cut of the

"WYCKOFF PATENT IMPERISHABLE GAS PIPE,"

manufactured by the NORTHWESTERN GAS AND WATER PIPE COMPANY.

This Pipe is made of White Pine, one inch to sixteen inches bore, in sections eight feet long, rounded in a lathe, coated inside and out with Asphaltum, connected with a tenon, or socket, and a thimble joint, perfectly air and water tight, being driven together with cement furnished by the Company. When laid its cost is about one half that of Iron Pipe, and is UNQUESTIONABLY the best Gas conducting Main in use.

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Union Foundry and Machine Shops,

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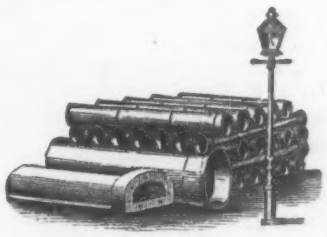

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Cast Iron Gas and Water Pipe,

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2 inch Pipes in 8 feet lengths. 3 inch to 60 inch cast in 12 feet lengths.

RETORTS AND MOUTH PIECES, LAMP POSTS, CONDENSING PIPE, HYDRAULIC MAINS, PURIFIERS, DRIPS, ELBOWS, T'S, CROSSES, SLEEVES, VALVES, &c., &c.

GAS-HOLDERS.

And every description of work necessary for Gas or Water Companies.

JESSE W STARR & SONS,

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Camden, New Jersey,

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames,

For Retort and other houses. Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS, for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves,

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

TELESCOPIC AND SINGLE,

With cast iron guide and suspension frames. GAS GOVERNORS or REGULATORS, STREET MAINS, from 1¼ to 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SIEVES, etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and about Gas Works. 226-1f

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PASCAL IRON WORKS,

Corner Fifth and Tasker Streets, Philadelphia, and No. 15 Gold Street, New York.

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STEPHEN MORRIS, THOMAS T. TASKER, JR., STEPHEN P. M. TASKER.

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EXHAUSTERS.—Exhausters and Compensators, By-Passes to pass from 4,000 to 150,000 Cubic feet of Gas per hour, with Engines, Governors, Pressure and Vacuum Guages.

SCRUBBERS — Single or Multitubular Scrubbers, with Self-Acting Pumps for Ammonia Water.

WASHERS.—Cataract and Single and Multitubular Spray Washers.

CONDENSERS.—Single and Multitubular Air and Water Condensers.

PURIFIERS.—For Purifying from 1,000 to 2,000,000 cubic feet capacity daily, with either wet or dry Lime, or Oxide of Iron, and with either Ash Rivetted or Wrought or Cast Iron Lime Sieves.

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Best quality American Charcoal Iron Boiler Tubes. Wrought Iron Tubes from one-eighth of an inch to ten inches diam., with all kinds of Fittings, Valves and Cocks, Gas and Steam Fitters' Tools, and all articles connected with the manufacture of Gas, Steam or Water.

Sole Manufacturers of P. MUNZINGER's Patent Purifiers, Dry Center Seals, Adjustable Hydraulic Main Stand, Wooden Lime Trays, Stand and Straddle Pipes, and Multitubular Water Condenser.

MR. P. MUNZINGER, Gas Engineer, has been connected with our Establishment as Engineer and Designer, and in charge of the Gas Works Department for the past fifteen years.

Plans, Specifications, and Estimates furnished, for Lighting up Towns, Cities, Factories, and Public Buildings, etc., etc., with Gas from Coal, Rosin, or Wood.

We would refer to the Gas Machinery erected by us, and in operation, at the following places:

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Williamsport, Pa.
Altoona, Pa.
Willkes Barre, Pa.
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Lancaster, Pa.
Lock Haven, Pa.
McKeesport, Pa.
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Hudson City, N. J.
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Salem, N. J.
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Fredonia, N. Y.
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Mansfield, Ohio.
People's Works, Cleveland, Ohio
Newark, Ohio.
Salem, Ohio.
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Chicago Gas-Light and Coke Co., Ill.
Jacksonville, Ill.
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National Asylum for Discharged Volunteer Soldiers, Milwaukee, Wis.

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Salem, Oregon.
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Illinois State Penitentiary, Joliet.
Hartford, Conn.
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And a number of others.

☞ See page 134 for Index to Advertisements.

SUPPLEMENT

TO THE AMERICAN

GAS-LIGHT JOURNAL

AND

Chemical Repertory,

PUBLISHED ON THE 2D AND 16TH OF EACH MONTH,

At No. 42 Pine Street, New York.

A. M. CALLENDER & CO.,
PROPRIETORS.

EDITOR—PROF. HENRY WURTZ.
Editor's Private Office, 26 Pine St., Room 36.

TUESDAY, APRIL 16, 1872.

Fletcher's Gas Furnace and Hot-Blast Blowpipe.

The specialty of this furnace is the burner. It is as simple as an ordinary Bunsen's burner, but the flame is solid to the centre. Copper will fuse in any part of the flame; and to make a crucible furnace simply requires a support for the crucible, and a fire-clay jacket to prevent radiation. The lower part is a chamber six inches by three inches, open at the bottom, in which the gas is partially mixed with air. This mixture is conducted to the top of the burner through a mass of fine tubes, with an arrangement to supply between each exactly the amount of air necessary to consume it instantly. A flame produced by this means, consuming twenty feet of gas per hour, is about two inches high and almost colorless. The whole of the available heat is generated below the object to be heated, which, therefore, is not also cooled by the passage of unburnt gas and air.

The point of greatest heat commences, as with a blowpipe, at the point of the blue cones, about half an inch or three quarters of an inch above the tubes; and if the flame is protected with a ring of fire-clay, continues uniform for some inches above. The great heating power of the hot-blast blowpipe is obtained by an arrangement which enables both gas and air to be supplied to the jet at an exceedingiy high temperature. The jet will fuse a strand of six or eight fine platinum wires into a head with a small point of flame, and will give a small light with a cylinder of lime. With the gas fully turned on, it will melt 3 ozs. of 18-carat gold on pumice-stone. Steel wire burns readily, with brilliant scintillations, and wrought-iron wire is readily fused. The additional heating power may be used or not, at will, and the blowpipe can be used either with the mouth or a foot blower; when used with the mouth the head is not confined in one position, as in case of the old form, and both hands are at liberty. The extreme power is exerted to the best advantage on as small objects as possible, and when the gas is turned down to a blue cone of about one or one and a half inches long. The point of this blue cone will fuse a few grains of platinum, supported on lime, in five or six seconds, if a foot blower is used. If, however, a smaller quantity is taken—say half a grain—it is fused into a bead instantly, either with the month or a foot blower. If a platinum wire is used, it should be held with the point exactly in front of the point of the blue cone. With care, a bead may be fused on the end of a platinum wire almost as thick as ordinary copper bell wire If a very fine wire is used, it will melt almost as quickly as it can be passed along the flame; in these experiments the eyes should be protected from the blinding glare of light, more especially in fusions on lime. For soldering and heating platinum crucibles, the gas should be turned full on, so as to produce a large rough flame, the heating power of which is about double that of the ordinary blowpipe. The lower burners need never be turned on more than is necessary to allow the flame just to reach the top of the coil. A trial of these apparatus in our laboratory has proved them to be most useful, but there is room for great improvement in the workmanship.—*Chemical News.*

[We do not give credit to many of the above statements, and shall await further proof.—ED.]

New Petroleum Furnace.

It is not likely that we shall have done with novelties in the line of petroleum furnaces, until this fuel shall be adapted to many of the minor operations of metallurgy and steam power practice. But in these the advantageous results will arise rather from the superior compactness, manageability, and obtainable intensity of heat, incident to such furnaces, than from the greater cheapness which the relatively higher calorific power of the fuel led many at the outset to think feasible. There are wanting data by which the comparative utility of the various systems proposed can be even approximately estimated. Among these are furnaces in which the fuel is vaporized before being admitted to the furnace, and, if we add the regenerator to save waste heat, we have simply the principle of the Siemens furnace with liquid fuel, and perhaps this, for many purposes, would give the best results. But a more simple and cheaper apparatus is the popular *sine qua non*, in the profitable consumption of liquid hydrocarbons; and whether the passage by capillary attraction of the liquid up to the surface of a porous bed of sand or artificial stone, its flow in thin sheets over the surface of nearly horizontal grate-bars, or its injection in a fine mist to the fire-pot, will afford the most usefulness, is undetermined, and, without more careful, extended, and costly experiments than we are likely very soon to have, the question will remain unanswered. In the meantime, it is well to note the occasional modifications which in some instances may be justly assumed to be improvements, and tending each, as one step forward, to secure practically the profitable employment of liquid fuel, even if they do not, in themselves, prove free from defects. Among the most recent of these is a furnace lately set up in the School of the Sorbonne in Paris, which requires no blast, is specially adapted for use in the laboratory, and affords temperatures very difficult to obtain with solid fuel. The oil drops from the nozzles of a series of branching pipes upon a grooved and neatly vertical grate, between the bars of which is furnished the requisite supply of air. The bars being heated by the flame cause the fuel to be rapidly vaporized, and in this form it combines most readily with the oxygen of the air, and gives an intense flame of great length. Any oil that fails of combustion from the grate-bars, as just indicated, drips into a hot receiver at the bottom of the furnace, and, more slowly vaporized, mingles its gases with those rapidly generated above, and is thus consumed. In lighting the furnace, it is necessary to first fill it with straw or shavings saturated with oil, the combustion of which heats the grate-bars to a temperature sufficient to volatilize the oil as it drops from the nozzles to the grate. There seems to be but slight variation between this and some other apparatus for the purpose, but we are not disposed to deny that the changes, slight as they are, may be productive of decided advantages, The plan seems a good one, and, with suitable devices for automatically adjusting the flow of oil to the intensity of combustion, to obtain perfect uniformity at any desired temperature, and with a vertical flue boiler so arranged that the lengthy tongues of flame would be brought into the most intimate contact with the heating surface, the method might perhaps be well employed in the solution of the vexed question of a cheap motor for household and small workshop use.—*Amer. Artisan.*

Contemporaneous Newspaper History.

[The *New York Times* lucubrates as follows in a late issue. Being ourselves totally destitute of any knowledge of the facts, or the lack of facts, whichever it may be; we are only putting on record one of the outward signs, of the inward animus, of the newspaper press, towards the gas fraternity, which is always very feebly tinctured with charity, christian or otherwise.—ED.]

THE METROPOLITAN GAS COMPANY.

[New York Times, March 31.]

Throughout the district supplied with gas by the above company, an impudent attempt is now being made to wheedle the inhabitants into signing a fraudulent petition. A man rings the door-bell, and asks for the lady or gentleman of the house. You go to the door. and the man asks you whether you have any particular complaint to make about the gas? Probably (not knowing what is up), you say, "No; not at this moment." The man then says, "You find the gas burns pretty well?" "Yes," you answer, not wishing to have an argument on the subject. "Well, then," says the visitor, "just put your name down in this book—right here; it will do you no harm." And we are sorry to say that a good many thoughtless people *are* putting their names down "right there," although they have smarted all the winter long under the extortions of this gas company, and will be made to smart next year ten times worse. And serve them right too—but the worst of it is, they are not the only sufferers. The gas company goes up to Albany with their signatures. They are shown to the Legislature, and used as an argument to convince Assemblymen and Senators that the people are perfectly satisfied with the gas, and the price at which it is supplied. The hawkers of the petitions take care to call at an hour when the gentlemen of the household are out. The ladies sign, not liking to refuse. Indeed, some people will sign almost anything that is put before them. If the gas company were to send a man round to say, "Do you wish a reform in the gas monopoly or not—do you wish to have a better light for less money," they would put the issue fairly. But then they would not get any signatures to their present fraudulent petition.

We trust our readers in the district in question will refuse to lend their names to a fraud. We print a letter received from a correspondent on the subject:

To the Editor of the New York Times:

One of the last insults offered to the people by the Metropolitan Gas Company, is a printed circular sent by them to the gas consumers of this district, coupled with the impudent request to sign it. I am pleased to say that but few, if any, comply with the request. It is virtually asking people to put their names to an untruth. I enclose you a copy of the petition; it is exactly in conformity with the actions of this company, who have practiced impositions on their gas consumers for years. It is evident this company fear the new gas company, and well they might, as all their customers will go over to the new one. A SUFFERER,
Forty-seventh street.

To the Honorable the Common Council of New York:

We, the undersigned, residents within the district of the city of New York supplied with gas by the Metropolitan Gas-Light Company, respectfully represent:

That we have for several years been, and now are, consumers of gas supplied by said company within said district.

That the gas supplied by this company is sufficient in quantity; that the light given therefrom is good and of sufficient candle-power; that we have no complaint to make in respect either to the quantity of gas supplied or to its illdminating power, or for any other cause; and we revoke any paper signed by us, or represented to be signed by us, to the contrary.

NEW YORK, March 27, 1872.

Benzole and Benzine.

Professor Charles A. Joy, in the *Journal of Applied Chemistry*, in reference to the mischievous muddle between these two words, due to the disgraceful ignorance of the American public on chemical subjects, and which has been repeatedly pointed out by us; gives the following interesting historical *resume:*

"In 1824 Faraday succeeded in separating a new compound of carbon and hydrogen from the residues found in the cylinders in which compressed gas was at that time delivered to consumers. He called it bicarburet of hydrogen, and described most of its properties in the accurate manner characteristic of this investigator. About ten years later Mitscherlich succeeded in making what proved to be identically the same body, by the action of caustic lime upon benzoic acid. He ought to have gone on and described it as bicarburet of hydrogen, but instead of doing so proposed the word benzine, as being more significant of its derivation from benzoic acid. Liebig, in reprinting Mitscherlich's papers, adds a foot note, in which he objects to the new name, and says it would be better to adhere to Faraday's original designation; but if we must have a new name, he suggests benzole as less likely to mislead, as the termination *ine* is generally confined to such substances as quinine, strychnine, etc., which have no analogies with the hydrocarbons. It thus appears that Liebig was the first to introduce the word benzole, and that it then meant identically the same thing as benzine. The French

writers have been in the habit of retaining Mitscherlich's word, while the English have adopted Liebig's, and it has thus come to pass that benzole and benzine have been tossed about in our literature in a very perplexing way. Some English writers spell the word benzene, and the final *e* of both terms is frequently dropped, so that we have in English benzol and benzin. It is probably more in accordance with the analogies of the English language to retain the termination *ole* and *ine* for the two words."

[We have long advocated a terminology which includes that here proposed by Prof. Joy. We see no reason, and have never seen any, for mutilating the Queen's English (or the "President's American") by the process of Germanization, which is now so common, making sulphide "sulphid," oxide "oxyd," and so on. More of this again.—ED.]

A Decidedly Effectual Remedy.

We learn from the papers that Chicago has been holding a boiler explosion investigation, and the Coroner's Jury have returned a verdict of "blew up from an excess of steam." It was the belief from the beginning that steam had something to do with it, and, therefore, the verdict did not excite much surprise; but the jurors, probably anticipating that it would not, for safety added the following recommendation—that, hereafter, all boilers be constructed with an aperture at least two inches in diameter, and that said aperture shall never be closed during the process of generating steam."

There must have been some eminently "practical men" on that jury. We fear, however, that some slight considerations, not wholly unconnected with economy of fuel, have failed to receive due attention from these distinguished Chicagoese. Their recent experience in the conflagration line may have led to a habitual contempt for such trifling matters."

THE UTILIZATION OF COAL DUST.—The most obvious, and most practised, method of converting comminuted coal into solid fuel, is to mingle it with some adhesive and combustible substance, like bitumen, pitch, tar, or rosin, and then mould it into cakes by pressure. This would do very well were it not that the more inflammable cementing hydrocarbon burns out first and lets the less combustible carbon of the coal fall in powder through the grate. This may be avoided by mingling the dust in the first instance with clay, which is done in Germany to the extent of thirty or forty per cent. of clay, but this compound burns slowly, and requires a larger furnace for the production of a given quantity of heat, and leaves a great residue of ash. By a peculiar method of working, not explained, and doubtless somewhat expensive, an experimenter at Nashville, Tenn., has reduced the proportion of clay to eight per cent. The thoroughness of manipulation required to reduce the clay to this extent must necessarily be somewhat costly, and at the best the method includes the addition of inert matter that, to say the least, is in the way in the furnace. It would be better if some material capable of combustion with about the same rapidity as coal were used as the uniting substance. It is possible that peat might subserve this purpose, and, if so, this much lauded but rather unreliable fuel might find a much more practicable use than has hitherto been found for it.—*Am. Artisan.*

CANDLES IN COMPRESSED AIR.—One of the things yet to be invented is a candle that will not smoke in compressed air, as, for example, in the air-chamber of caissons, like that of the East River bridge. Whoever *does* this will be a public benefactor, for the smoke is an unmitigated nuisance. This is due, no doubt, to two causes. The gases liberated by the heat are under the abnormal pressure, and, therefore, reduced in volume; hence there is a smaller flame and less surface exposed to the oxygen of the air. Again, the heat due to the combustion of a fixed quantity of gas is itself an unchangeable quantity. In the normal atmosphere, this is sufficient to create a circulation of air about the flame, by heating and rarifying the particles that come in contact with it. Of course, when the density of the air is doubled, twice as many particles as before have to be heated to create the same circulation, and the result is that much of the time a large part of the carbon passes off unconsumed for the lack of a proper supply of oxygen.—*Exchange.*

LIGHTING STREET CARS.—Following an invention used to some extent in France and England, San Francisco thinks of introducing street cars in which ordinary illuminating gas furnishes the motive power. At the late Mechanics' Fair held in that city a gas engine war exhibited by Mr. Pioche, and worked so satisfactorily that Mr. H. R. Robertson has determined to apply it in the propulsion of street cars. It will occupy but four feet square, and may be rvn for 12 hours at vn expense of not more than $3, and one man may act as engineer, conductor, and driver. It is claimed that no noise, smoke, or danger of explosion will attend its use.

GAS-ENGINES.—In engines which employ an explosive mixture of air and gas for the motive force, a limited quantity of the explosive mixture is held in reserve under the pressure of several atmospheres in a reservoir in connection with the engine. In one recently devised in England, a suitable arrangement of valves and gearing, a charge is admitted into a chamber immediately connected with the cylinder, and forced through the meshes of a series of wire-gauze diaphragms. A lambent flame is kept burning upon the surface of the gauze diaphragms by gas, and this ignites the successive changes. The diaphragms prevent the return of the flame. Thus the gaseous mixture exerts a true pressure due to expansion upon the piston.—*Am. Artisan.*

RECENT AMERICAN PATENTS.

Pertaining to the Specialties of this Journal, to date ending March 30th, 1872.

123,977.—Gasometer.—J. Butler.
124,017.—Lamp and Burner.—I. W. Shaler.
124,097.—Gas Stove.—W. H. Tayler.
124,033.—Water Cut-Off.—J. W. Burkholder.
124,038.—Water Elevator.—J. Daykin.
124,053.—Cut-Off for Water Pipe.—F. H. Goddard.
124,250.—Gas Retort.—J. Butler.
124,269.—Water and Steam Valve.—C. H. Hopkins.
124,209.—Water Elevator.—C. Houghton.
124,328.—Water Elevator.—J. L. Burch.
124,425.—Hydrocarbon Vapor Burner.—Dopp and Stark.
124,495.—Steam and Gas Engine.—J. A. H. Ellis.
124,441.—Gas from Coal Tar.—J. Kidd.
4,800.—Apparatus for the Manufacture of Gas.—E. Jones (reissue.)
4,977.—Gas Apparatus. Sealing Dip-Pipe of.—R. B. Chapman, (reissue.)
124,624.—Water and Sewer Pipe.—J. S. Pierson.
124,598.—Machine for Making Tin-Lined Lead Pipe.—J. E. Granniss.
124,866.—Gas Burner.—T. Ward.
124,869.—Oxyhydrogen Gas Burner.—A. W. Wilkinson.
124,671.—Air and Gas Engine.—A. H. de Villeneuve.
124,766.—Gas Apparatus.—C. Seeger.
4,821.—Manufacture of Illuminating Gas.—A. W. Wilkinson.
124,673.—Street Lamp.—M. B. Dyott.
124,666.—Foul Air Escape for Waste Pipes.—J. Daniels.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

April 16, 1872

DELIVERED IN NEW YORK.

English Cannel.			
Ince Hall	$13 00	@	13 50
Kirkless Hall	12 50	@	13 00
English Caking Coals.			
Newcastle Gas	$7 50	@	7 75
Liverpool caking	7 25	@	7 50
British Province Coals.			
International—At Mines, $2 00 in currency	— —		
Block House—At Mines, $1 50, Gold	6 25		
Little Glace Bay—At Mines, 1 60, Gold	— —		
Pennsylvania Coals.			
Penn Gas Coal—Delivered in New York	$6 87½	@	7 10
Westmoreland	6 87½	@	7 10
Shafton	7 10	@	— —
Youghiogheny	7 25	@	0 00
West Virginia Coals.			
Murphy Run	$6 75	@	0 00
Despard	6 75	@	0 00
West Fairmont	6 87½	@	7 00
American Gas Coal	6 62½	@	6 75
Fairmont	6 75	@	0 00
Newburgh Orrel	6 75	@	0 00
Pinnickinick	6 75	@	0 00
Cloverhill of Virginia	5 25	@	5 50
McKenzie Compound Mixture			8 00
American Cannel Coals.			
Peytona of West Virginia	$14 00	@	14 50
Darlington of Pennsylvania	— —	@	— —
American Cannel	$10 00	@	10 50
Asphalts.			
Albertite of New Brunswick	$18 00	@	18 00
Ritchie Mineral of West Virginia	16 60	@	16 60
Trinidad Bitumen	— —	@	14 05

Advertisers Index.

☞ In looking for advertisements, see figures 1 to 10, within brackets, at head of advertisement pages.

GAS BURNERS, APPARATUS, ETC.

American Meter Co.—West 22nd st., N. Y., Arch and 22d st., Phil., 23 West st., Boston ... 8
Cast Iron Gas and Water Pipe—Smith & Ellis, York and Meyer streets, Phila., Pa ... 6
Gas-Burners—C. Gefrorer, 259 Commerce st., Philadelphia, Pa ... 8
Gas Purification—St. John and Cartwright ... 8
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry st., Philadelphia, Pa ... 8
Gasometers, Etc.—Geo. Stacey & Co., Cincinnati, O ... 2
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway ... 6
Gasholders, Etc.—Deily & Fowler, 39 Laurel st., Philadel ... 6
Gas and Water Pipes—B. S. Benson & Son, Allentown, Pa ... 7
Gasometers, &c.—Keystone Iron Works—2132 Filbert st., Philadelphia ... 6
Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J ... 2
Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Avenue C., N. Y ... 7
Patent Gas Exhauster—Smith & Sayre, 95 Liberty sttreet ... 4
Cast Iron Gas and Water Pipes—R. D. Wood & Co., Philadelphia Pa ... 9
Cast Iron Gas and Water Pipe—Henry G. Nichols, 14 Platt street, New York ... 3
Cast Iron Gas and Water Pipe—Jno. McNeal & Sons, 117 Broadway, N. Y ... 3
Manufacture of Illuminating Gas from Coal—Darius Davidson, 4 Dey st., N. Y ... 2
The Gibson Improvement—The American Coal Gas Light Improvement Co., 79 Water street, Boston, Mass ... 2
Agency for the Gibson Improvement—W. H. Grenelle, 41 Pine street, N. Y ... 4
The Gas Light Co. of America—Box 5220, New York city ... 4
Gas Screens—American Gas Screen Manufacturing Co., Haverhill, Mass ... 7
Northwestern Gas and Water Pipe Co.—646 Wabash Ave., Chicago, Ill ... 9
Gas Apparatus, &c.—Blanchard & Arnold, Fourth and Fowler sts., Milwaukee, Wis ... 9

GAS COALS.

Ohio Gas Cannel—George Merryweather, 5½ Pine street, New York ... 5
Despard Coal Co.—Parmelee & Bros., Agents, 32 Pine st., N. Y ... 6
Gas Coals—Bird, Perkins & Job, 86 South st., N. Y ... 7
The Newburg Orrel Coal Company—Chas. W. Hays, Agent in New York, Trinidad Building, 111 B'way, Room 7 ... 7

FOUNDRIES.

Atlantic Dock Iron Works—Hoy, Kennedy & Co., Office 98 Liberty street, N. Y., P. O. Box 2348 ... 2
Cast-Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md ... 8
Continental Works—T. F. Rowland, Greenpoint ... 7
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Sons ... 9
Louisville Pipe Works—Dennis Long, cor. 9th and Water sts., Louisville, Ky ... 9
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman & Wilkins streets, Pittsburg, Pa ... 7
Pascal Iron Works—Morris, Taskar & Co., Philadelphia ... 10
Providence Steam and Gas Pipe Co., Providence, R. I.—H. A. Branch, Agent ... 6
Gloucester Iron Works—J. P. Michellon, Sec., 6 North 7th street, Phila., Pa ... 3

WATER METERS, PUMPS, ETC.

Aubin Water Meter—H. Q. Hawley, Albany, N. Y ... 8
Cast Iron Pipes for Water and Gas—Riley A. Brick, 89 White street, N. Y ... 6
Valves for Water, Steam and Gas—Ludlow Valve Man'g Co., 193 River street, Troy, N.Y ... 7
Water Pipes, etc.—S. Fulton & Co., 412 Walnut st., Phila ... 9

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, etc., 58 Goerck st., New York ... 5
Cheltenham Fire Brick and Clay Retort Works—Evens & Howard, 100 South Eleventh street, St. Louis, Mo ... 7
Jersey City Fire Brick Works—J. H. Gautier & Co., Greene Essex and Bergen sts., Morris Canal Basin, N. J ... 4
Laclede Fire Brick Works, 107 North Levee, St. Louis, Mo ... 5
Manhattan Clay Retort Works, 15th st., near Av. C, N. Y ... 5
Philadelphia Fire Brick Works, Vine and 23d sts., Phila ... 5
Clay Retorts, Fire Brick, Tiles, etc.—Wilson & Gardner, Lockport, Westmoreland Co., Pa ... 5
Retorts, Etc.—Geo. C. Hicks & Co., Baltimore Md ... 8

LAMPS, STOVES, PETROLEUM, ETC.

Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal ... 4

MISCELLANEOUS.

Architect and General Gas Engineer—William Farmer, 111 Broadway Room 91 ... 2
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind ... 2
Grahamite or Ritchie Mineral—27 South Charles street, Baltimore, Md ... 5
School of Mines, Columbia College, East 49th st ... 7
Scientific and Chemical Expert—Prof. H. Wurtz, 26 Pine street, room 36, N. Y ... 7
Screening Shovels—O. R. Butler, 126 Maiden Lane, N. Y ... 6
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y ... 4
On the Advantages of Gas for Cooking and Heating—Magnus Ohren, Lower Sydenham, London, S. E ... 3
Fodell's System of Bookeeping—A. M. Callender & Co., 42 Pine st., New York ... 5
A Synopsis of British Gas Lighting—Jas. R. Smedberg, San Francisco, Cal ... 6
Journal of the Franklin Institute—Prof. W. H. Wahl, Franklin Inst., Phila,, Pa ... 6
Curley's Improved Retort Setting and Independent Damper—Thos. Curley, Wilmington, Del ... 7
American Journal of Science and Arts—Silliman and Dana, New Haven Conn ... 9